# DEVELOPMENT OF FERTILIZER RECOMMENDATIONS FOR IRRIGATED GRAIN & OILSEED CROPS IN SOUTHERN ALBERTA

Farming for the Future Projects
#83-0028 and #87-0003

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Funding Support by:

1) Soils Branch, Plant Industry Division
Alberta Agriculture
2) Farming for the Future, Research Division
Alberta Agriculture

Submitted: August, 1989.

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## ABSTRACT

Extensive field research was conducted in southern Alberta to develop fertilizer recommendations for irrigated grain and oilseed crops. Crop response to nitrogen fertilizer was correlated with soil test nitrate-nitrogen to develop yield increase tables for soft wheat, hard wheat, durum wheat, 3-M wheat, barley, canola and flax. Crop response to phosphorus was variable. Seed placed phosphorous was more effective than phosphorus deep banded with nitrogen. Soil test phosphorus levels were not a good indication of when to expect response. Potassium fertilizer responses were neither expected nor obtained because of high soil test levels and the high content of potassium bearing minerals in southern Alberta soils. Yield responses to sulfur fertilizer were not obtained because of the relatively high $SO_4$-S levels in irrigation water and subsoils. Soil tests for zinc and boron frequently indicated deficiencies however, micronutrient fertilizers did not increase yields. This indicated problems with correlations between existing soil tests and crop responses to micronutrients.

## 1. INTRODUCTION

Accurate fertilizer crop response data is vital for irrigation farmers to achieve optimum crop production. Producers attempt to attain this through timely field operations, irrigation management (McKenzie and Chanasyk, 1986) and fertilization.

Preliminary fertilizer response recommendations for irrigated crops were first made available in 1987, to provide reliable fertilizer recommendations to farmers. These recommendations were developed from fertilizer plots established from 1982 to 1986, throughout the irrigated areas of southern Alberta by the Soils Branch, Alberta Agriculture. Results were published by McKenzie et al. (1987). A Farming for the Future grant (Project 83-0028) provided additional funding to conduct field research in 1987. The purpose of this report is to summarize all the results, and verify and up date the recommendations for soft white spring wheat, hard red spring wheat, durum wheat, 3-M wheat, feed and malting barley, canola and flax.

## 2. OBJECTIVES

The primary objective of this study was to determine the yield response of irrigated grain and oilseed crops to a range of nitrogen (N) and phosphorus (P) fertilizers on different soil textures and over a period of years. A second objective was to determine if potassium (K), sulfur (S) and micronutrient fertilizers were required. In 1987, experiments were preformed to verify recently developed crop response information and fine tune fertilizer recommendation tables.

## 3. MATERIALS & METHODS

### 3.1 Plot Design and Management

The crops and plot locations established from 1982 to 1987 are reported in Table 1. In 1987, plots were located at two major sites. One was on an Orthic Brown Chernozemic soil (Chin loam) on the NW$^1/_4$ 9-14-16 W4, north of Vauxhall and the other on an Orthic Dark Brown Chernozemic soil (Lethbridge clay loam) on the NE$^1/_4$ 35-9-21 W4, northeast of Lethbridge.

Specific plot designs changed slightly from year to year. Normally, eleven rates of deep banded N (ammonium nitrate) were tested: 0, 20, 40, 60, 80, 100, 120, 140, 160, 200 and 240 kg/ha with a constant rate of 100 kg/ha of $P_2O_5$ (monoammonium phosphate). From 1982 to 1984, the P treatments were 0, 20, 40, 60, 80, and 100 kg/ha of deep banded $P_2O_5$. The forms of P used were either monoammonium phosphate or monocalcium phosphate. In 1985 to 1987,

Table 1. Location of plots and crops studied in the development of fertilizer recommendations for irrigated grains and oilseeds 1982 to 1987.

| Crop | 1982 | 1983 | 1984 | 1985 | 1986 | 1987 |
|---|---|---|---|---|---|---|
| Soft Wheat | Taber<br>Vauxhall<br>Champion | Coaldale<br>Taber<br>Champion<br>Bow Island | Coaldale<br>Taber<br>Burdett<br>Seven Persons | Lethbridge<br>Taber<br>Bow Island<br>Strathmore | Lethbridge<br>Taber<br>Bow Island<br>Strathmore | Lethbridge<br>Vauxhall |
| Hard Wheat | | Coaldale | Raymond | Lethbridge<br>Bow Island | Lethbridge<br>Bow Island | Lethbridge<br>Vauxhall |
| HY320 | | | Coaldale<br>Bow Island | Lethbridge<br>Bow Island | Lethbridge<br>Bow Island | Lethbridge<br>Vauxhall |
| Durum | | Burdett | Burdett | Lethbridge<br>Bow Island | Lethbridge<br>Bow Island | Lethbridge<br>Vauxhall |
| Barley | Vauxhall | Coaldale<br>Burdett | Raymond<br>Coaldale | Lethbridge<br>Bow Island<br>Strathmore<br>Taber | Lethbridge<br>Bow Island<br>Strathmore | Lethbridge<br>Vauxhall |
| Canola | | | Coaldale<br>Burdett<br>Bow Island | Lethbridge<br>Bow Island<br>Bow Island | Lethbridge<br>Bow Island | Lethbridge<br>Vauxhall |
| Flax | | | Burdett | Lethbridge<br>Bow Island | Lethbridge<br>Bow Island | Lethbridge<br>Vauxhall |

the P treatments included: a control, 15, 30, 60 and 90 kg/ha of deep banded $P_{2}0_{5}$; 15, 30, and 60 kg/ha of seed placed $P_{2}0_{5}$; 30 and 60 kg/ha of broadcast and incorporated $P_{2}0_{5}$ or deep banded acid urea phosphate; and three rates of split applied $P_{2}0_{5}$: i) 15 kg/ha seed placed + 15 kg/ha side banded, ii) 15 kg/ha seed placed + 30 kg/ha side banded, and iii) 20 kg/ha seed placed + 40 kg/ha side banded. All P treatments received a blanket application of deep banded N at 120 kg/ha. In 1983 and 1984, the remaining nutrients were evaluated using the minus method. Nutrients used were K at 60 kg/ha of $K_{2}0$, S at 30 kg/ha, boron (B) at 5 kg/ha, zinc (Zn) at 5 kg/ha and copper (Cu) at 1 kg/ha. All nutrients were deep banded together with a constant rate of N (120 kg/ha) and $P_2O_5$ (100 kg/ha). In all other treatments, all nutrients were applied except one. In 1985 to 1987 when significant responses had not been obtained in 1983 and 1984, the design was adjusted to 3 treatments: i) N + P only, ii) N + P and K + S, and iii) N + P and K + S and a blanket application of soil applied and later in the season, foliar applied micronutrients. All the soil applied rates were the same as 1983 and 1984 except the B application was reduced to 2 kg/ha. The foliar applied rates were 5% Zn at 5 l/ha, 1% manganese (Mn) at 5 l/ha, and 4% molybdenum (Mo) at 0.5 l/ha. A control treatment, which received no fertilizer was always included. There were 20 to 28 treatments at each plot site, replicated four times. All trials were in a randomized complete block design.

At each plot site, separate soil samples were taken either in late fall or early spring from each replicate at 0-15, 15-30, 30-60 and 60-90 cm depths. All soil analyses was conducted at the Alberta Agricultural Soil and Animal Nutrition Laboratory, using their standard procedures. Nitrate nitrogen and phosphorus were extracted using a solution of 0.3N ammonium fluoride and 0.03N sulfuric acid (Miller-Axley method). Phosphorus was also extracted using 0.5M sodium bicarbonate at a pH of 8.5 (Olsen method). This method is not routinely used at this laboratory. Potassium was extracted using a 1.0N ammonium acetate solution. Sulfate-sulfur was extracted with 0.01M calcium chloride. All metal micronutrients were extracted using 0.005M diethylene triamine penta-acetic acid (DTPA) 0.01M calcium chloride and 0.01M triethanolamine (TEA) adjusted to a pH of 7.3. Boron was extracted with distilled, de-ionized hot water. Detailed descriptions of each analytical method are provided by Alberta Agriculture (1988).

From 1982 to 1984, plots were seeded either by the cooperating farmer, or with a Kincaid drill (without a fertilizer box). In 1985 to 1987, all plots were seeded with a 10 row self-propelled seed drill which could seed place and/or side band fertilizer. Grains were seeded at 135 kg/ha, canola at 9 kg/ha and flax at 50 kg/ha. Most plots were irrigated with existing sprinkler equipment by cooperating farmers. Soil moisture was monitored on a weekly basis with a neutron moisture probe. In most of the trials moisture was not permitted to drop below 50% of the soil available moisture in the rooting zone. All crops were harvested with a plot combine except flax, which was hand harvested.

Research for this project was conducted using metric units. Fertilizer response tables and information are reported in imperial units because this is how most Alberta soil testing laboratories report results and recommendations.

## 3.2 Data Analysis and Crop Response Model

Regression techniques were used to fit a mathematical equation to express crop yield as a function of soil test nitrogen and nitrogen fertilizer application data for the various crops. A hyperbolic equation of the following form was used:

$$Y = Ns \ / b_o + b_1 (Ns) \qquad (1)$$

where: $Y$ = yield (kg/ha)

$Ns = N0_3\text{-N}$ (0-60 cm) + Fertilizer N Applied (kg/ha)

$b_o, b_1$ = regression coefficients

Regression modelling was achieved by utilizing a Langmuir form of equation (1).

$$Ns/Y = bo + b1 (Ns) \qquad (2)$$

The basic assumptions of this model for irrigated crop response data were:

a) Crop response to soil test nitrogen ($NO_3$-N) to a depth of 60 cm was considered equal to applied nitrogen fertilizer and

b) Moisture was normally not a restriction to crop production.

Individual regression equations were fitted for each crop site to identify sites having crop response restrictions. The final model coefficients for each crop utilized maximum crop response cases as well as an average of all sites.

The basic assumptions are further discussed in Section 4.1.

## 4. RESULTS and DISCUSSION

The 1982 to 1987 data base represents the largest single source of fertilizer response information for irrigated small grain and oilseed crops ever conducted in southern Alberta. A range of soil types and textures were included in the experiments and the five year time period permitted a range of climate years.

### 4.1 Nitrogen

A major assumption is that soil N (SN) to a depth of 60 cm and fertilizer N (FN) efficiency are equal. This simply means that a crop would take up 1kg/ha of soil N with the same efficiency as 1 kg/ha of fertilizer N. Therefore, the model assumes that SN and FN are in effect interchangeable in terms of their effect on crop yield. Further, if the model used SN to 90 cm instead of 60 cm, the relationship would no longer be 1:1. Recent research by Carefoot et al. (1989) with soft wheat however, demonstrated that this may not necessarily be true. They found the efficiency of SN and FN were dependent on amounts and depth at which soil N is found in the soil. Comparison of their results to the preliminary soft wheat N fertilizer response table (McKenzie et al., 1987) showed that maximum profit was predicted with reasonable accuracy when SN levels were less than 152 lb/ac (170 kg/ha) (Figure 1). When SN is above this level, the N fertilizer response chart under predicted fertilizer N response.

Although plant uptake of SN versus FN is more complex than the proposed model, SN:FN relationship is a place to start. For the purpose of making fertilizer recommendations to farmers it was decided to continue with the assumption that soil N (SN) and fertilizer N (FN) efficiency are equal for several reasons:

1. The 1:1 relationship of SN to FN has been routinely used by soil testing labs.
2. Research has indicated that the efficiency of plant uptake of $N0_3$-N decreases with increasing soil depth. However, there is insufficient scientific information available on how the yield response to fertilizer N is affected by the depth of soil nitrate nitrogen. The decreasing efficiency of SN with soil depth does not necessarily mean that the crop requires more FN. The important effect is how the increasing depth of the SN affects the FN response curve.
3. Work by Carefoot et al.(1989) was only for soft wheat at one location for two years. Further research work would have to be conducted to further characterize the relationship of SN to FN on various soil types with a number of crops having different rooting patterns.
4. All fertilizer in the Carefoot et al (1989) study was broadcast and incorporated. All N fertilizer applied in this FFF project was deep banded. It is widely accepted that deep banded N fertilizer placement results in greater efficiency of plant uptake than broadcast N fertilizer under irrigated conditions (Kucey and Schaalje, 1986; Kucey et al., 1986). Therefore, direct comparison of Carefoot et al. (1989) results to the preliminary N response curve for soft wheat (McKenzie et al., 1987) may not have been valid.
5. The variance between the preliminary N response curve for soft wheat (McKenzie et al., 1987) and the results by Carefoot et al. (1989) were minimal when soil test levels (0-60 cm) were below 170 kg/ha(152 lb/ac) of $NO_3$-N (Figure 1), which is the range in which most farm fields occur.

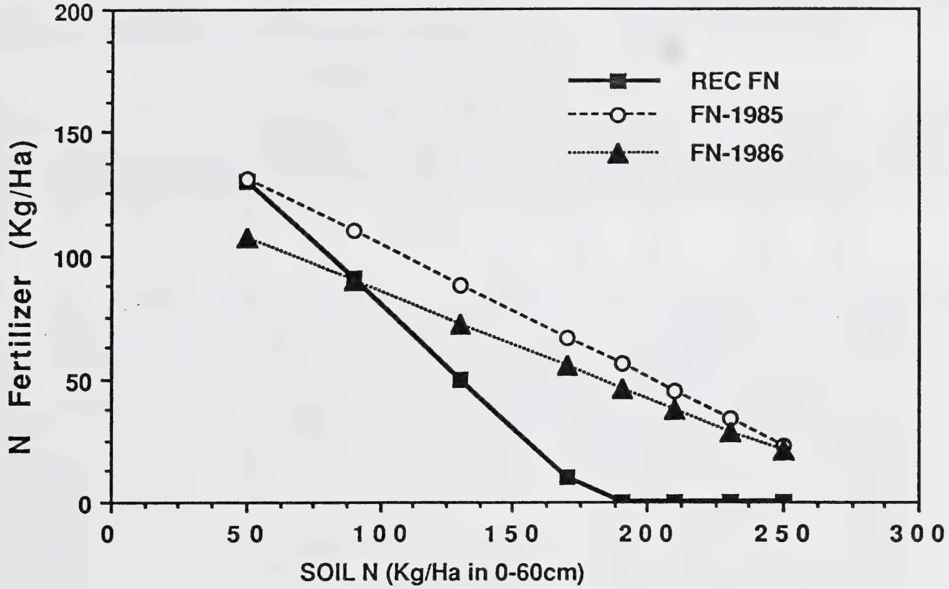

Figure 1. Comparison of recommended FN (REC FN) (McKenzie et al) with FN for maximum profit in 1985 and 1986 (FN-1985 and FN-1986) (Carefoot et al., 1989).

In the preliminary report (McKenzie et al., 1987) nitrogen fertilizer response tables were reported for each crop. The tables were for optimum crop production conditions. In this final report, two sets of nitrogen response tables have been prepared for each crop. The first is an updated revision of the original tables for producers that strive for optimum crop production, while the second set of tables is for average or less than optimum crop conditions. Sub-optimum production may result due to yield limiting problems such as irrigation equipment restrictions, or environmental problems beyond the control of a farmer such as unseasonally warm or cool conditions.

Nitrogen fertilizer crop yield tables for both optimum and sub-optimum (average) conditions have been developed (Tables 2 to 10) for all crops. Table 11 gives the response coefficients for the crops as a function of N supply.

Table 2. Predicted yield of irrigated Feed Barley under average and optimum growing conditions.

PREDICTED CROP YIELD (BU/AC) TABLE

CROP=FEED BARLEY | IRRIGATION=AVERAGE

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 17.2 | 29.5 | 38.6 | 45.7 | 51.4 | 56.1 | 59.9 | 63.2 | 66.0 | 68.4 | 70.5 | 72.4 | 74.0 | 75.5 | 76.8 | 78.1 |
| 20 | 29.5 | 38.6 | 45.7 | 51.4 | 56.1 | 59.9 | 63.2 | 66.0 | 68.4 | 70.5 | 72.4 | 74.0 | 75.5 | 76.8 | 78.1 | 79.1 |
| 30 | 38.6 | 45.7 | 51.4 | 56.1 | 59.9 | 63.2 | 66.0 | 68.4 | 70.5 | 72.4 | 74.0 | 75.5 | 76.8 | 78.1 | 79.1 | 80.1 |
| 40 | 45.7 | 51.4 | 56.1 | 59.9 | 63.2 | 66.0 | 68.4 | 70.5 | 72.4 | 74.0 | 75.5 | 76.8 | 78.1 | 79.1 | 80.1 | 80.1 |
| 50 | 51.4 | 56.1 | 59.9 | 63.2 | 66.0 | 68.4 | 70.5 | 72.4 | 74.0 | 75.5 | 76.8 | 78.1 | 79.1 | 80.1 | 80.1 | 80.1 |
| 60 | 56.1 | 59.9 | 63.2 | 66.0 | 68.4 | 70.5 | 72.4 | 74.0 | 75.5 | 76.8 | 78.1 | 79.1 | 80.1 | 80.1 | 80.1 | 80.1 |
| 70 | 59.9 | 63.2 | 66.0 | 68.4 | 70.5 | 72.4 | 74.0 | 75.5 | 76.8 | 78.1 | 79.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 |
| 80 | 63.2 | 66.0 | 68.4 | 70.5 | 72.4 | 74.0 | 75.5 | 76.8 | 78.1 | 79.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 |
| 90 | 66.0 | 68.4 | 70.5 | 72.4 | 74.0 | 75.5 | 76.8 | 78.1 | 79.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 |
| 100 | 68.4 | 70.5 | 72.4 | 74.0 | 75.5 | 76.8 | 78.1 | 79.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 |
| 110 | 70.5 | 72.4 | 74.0 | 75.5 | 76.8 | 78.1 | 79.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 |
| 120 | 72.4 | 74.0 | 75.5 | 76.8 | 78.1 | 79.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 |
| 130 | 74.0 | 75.5 | 76.8 | 78.1 | 79.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 |
| 140 | 75.5 | 76.8 | 78.1 | 79.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 |
| 150 | 76.8 | 78.1 | 79.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 | 80.1 |

PREDICTED CROP YIELD (BU/AC) TABLE

CROP=FEED BARLEY | IRRIGATION=OPTIUM

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 18.5 | 33.4 | 45.7 | 56.0 | 64.7 | 72.2 | 78.8 | 84.5 | 89.6 | 94.1 | 98.2 | 101.8 | 105.1 | 108.1 | 110.9 | 113.4 |
| 20 | 33.4 | 45.7 | 56.0 | 64.7 | 72.2 | 78.8 | 84.5 | 89.6 | 94.1 | 98.2 | 101.8 | 105.1 | 108.1 | 110.9 | 113.4 | 115.8 |
| 30 | 45.7 | 56.0 | 64.7 | 72.2 | 78.8 | 84.5 | 89.6 | 94.1 | 98.2 | 101.8 | 105.1 | 108.1 | 110.9 | 113.4 | 115.8 | 117.9 |
| 40 | 56.0 | 64.7 | 72.2 | 78.8 | 84.5 | 89.6 | 94.1 | 98.2 | 101.8 | 105.1 | 108.1 | 110.9 | 113.4 | 115.8 | 117.9 | 119.9 |
| 50 | 64.7 | 72.2 | 78.8 | 84.5 | 89.6 | 94.1 | 98.2 | 101.8 | 105.1 | 108.1 | 110.9 | 113.4 | 115.8 | 117.9 | 119.9 | 121.8 |
| 60 | 72.2 | 78.8 | 84.5 | 89.6 | 94.1 | 98.2 | 101.8 | 105.1 | 108.1 | 110.9 | 113.4 | 115.8 | 117.9 | 119.9 | 121.8 | 123.5 |
| 70 | 78.8 | 84.5 | 89.6 | 94.1 | 98.2 | 101.8 | 105.1 | 108.1 | 110.9 | 113.4 | 115.8 | 117.9 | 119.9 | 121.8 | 123.5 | 125.1 |
| 80 | 84.5 | 89.6 | 94.1 | 98.2 | 101.8 | 105.1 | 108.1 | 110.9 | 113.4 | 115.8 | 117.9 | 119.9 | 121.8 | 123.5 | 125.1 | 126.6 |
| 90 | 89.6 | 94.1 | 98.2 | 101.8 | 105.1 | 108.1 | 110.9 | 113.4 | 115.8 | 117.9 | 119.9 | 121.8 | 123.5 | 125.1 | 126.6 | 128.0 |
| 100 | 94.1 | 98.2 | 101.8 | 105.1 | 108.1 | 110.9 | 113.4 | 115.8 | 117.9 | 119.9 | 121.8 | 123.5 | 125.1 | 126.6 | 128.0 | 129.3 |
| 110 | 98.2 | 101.8 | 105.1 | 108.1 | 110.9 | 113.4 | 115.8 | 117.9 | 119.9 | 121.8 | 123.5 | 125.1 | 126.6 | 128.0 | 129.3 | 130.6 |
| 120 | 101.8 | 105.1 | 108.1 | 110.9 | 113.4 | 115.8 | 117.9 | 119.9 | 121.8 | 123.5 | 125.1 | 126.6 | 128.0 | 129.3 | 130.6 | 131.8 |
| 130 | 105.1 | 108.1 | 110.9 | 113.4 | 115.8 | 117.9 | 119.9 | 121.8 | 123.5 | 125.1 | 126.6 | 128.0 | 129.3 | 130.6 | 131.8 | 132.9 |
| 140 | 108.1 | 110.9 | 113.4 | 115.8 | 117.9 | 119.9 | 121.8 | 123.5 | 125.1 | 126.6 | 128.0 | 129.3 | 130.6 | 131.8 | 132.9 | 134.0 |
| 150 | 110.9 | 113.4 | 115.8 | 117.9 | 119.9 | 121.8 | 123.5 | 125.1 | 126.6 | 128.0 | 129.3 | 130.6 | 131.8 | 132.9 | 134.0 | 135.0 |

Table 3. Predicted yield of irrigated Malt Barley under average and optimum growing conditions.

PREDICTED CROP YIELD (BU/AC) TABLE

CROP=MALT BARLEY | IRRIGATION=AVERAGE

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 16.6 | 28.4 | 37.1 | 43.8 | 49.1 | 53.5 | 57.1 | 60.2 | 62.8 | 65.0 | 67.0 | 68.7 | 70.3 | 71.7 | 72.9 | 74.0 |
| 20 | 28.4 | 37.1 | 43.8 | 49.1 | 53.5 | 57.1 | 60.2 | 62.8 | 65.0 | 67.0 | 68.7 | 70.3 | 71.7 | 72.9 | 74.0 | 75.0 |
| 30 | 37.1 | 43.8 | 49.1 | 53.5 | 57.1 | 60.2 | 62.8 | 65.0 | 67.0 | 68.7 | 70.3 | 71.7 | 72.9 | 74.0 | 75.0 | 75.0 |
| 40 | 43.8 | 49.1 | 53.5 | 57.1 | 60.2 | 62.8 | 65.0 | 67.0 | 68.7 | 70.3 | 71.7 | 72.9 | 74.0 | 75.0 | 75.0 | 75.0 |
| 50 | 49.1 | 53.5 | 57.1 | 60.2 | 62.8 | 65.0 | 67.0 | 68.7 | 70.3 | 71.7 | 72.9 | 74.0 | 75.0 | 75.0 | 75.0 | 75.0 |
| 60 | 53.5 | 57.1 | 60.2 | 62.8 | 65.0 | 67.0 | 68.7 | 70.3 | 71.7 | 72.9 | 74.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 |
| 70 | 57.1 | 60.2 | 62.8 | 65.0 | 67.0 | 68.7 | 70.3 | 71.7 | 72.9 | 74.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 |
| 80 | 60.2 | 62.8 | 65.0 | 67.0 | 68.7 | 70.3 | 71.7 | 72.9 | 74.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 |
| 90 | 62.8 | 65.0 | 67.0 | 68.7 | 70.3 | 71.7 | 72.9 | 74.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 |
| 100 | 65.0 | 67.0 | 68.7 | 70.3 | 71.7 | 72.9 | 74.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 |
| 110 | 67.0 | 68.7 | 70.3 | 71.7 | 72.9 | 74.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 |
| 120 | 68.7 | 70.3 | 71.7 | 72.9 | 74.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 |
| 130 | 70.3 | 71.7 | 72.9 | 74.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 |
| 140 | 71.7 | 72.9 | 74.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 |
| 150 | 72.9 | 74.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 |

PREDICTED CROP YIELD (BU/AC) TABLE

CROP=MALT BARLEY | IRRIGATION=OPTIUM

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 17.9 | 32.2 | 43.9 | 53.6 | 61.8 | 68.9 | 75.0 | 80.4 | 85.1 | 89.3 | 93.1 | 96.5 | 99.5 | 102.3 | 104.8 | 107.2 |
| 20 | 32.2 | 43.9 | 53.6 | 61.8 | 68.9 | 75.0 | 80.4 | 85.1 | 89.3 | 93.1 | 96.5 | 99.5 | 102.3 | 104.8 | 107.2 | 109.3 |
| 30 | 43.9 | 53.6 | 61.8 | 68.9 | 75.0 | 80.4 | 85.1 | 89.3 | 93.1 | 96.5 | 99.5 | 102.3 | 104.8 | 107.2 | 109.3 | 111.3 |
| 40 | 53.6 | 61.8 | 68.9 | 75.0 | 80.4 | 85.1 | 89.3 | 93.1 | 96.5 | 99.5 | 102.3 | 104.8 | 107.2 | 109.3 | 111.3 | 113.1 |
| 50 | 61.8 | 68.9 | 75.0 | 80.4 | 85.1 | 89.3 | 93.1 | 96.5 | 99.5 | 102.3 | 104.8 | 107.2 | 109.3 | 111.3 | 113.1 | 114.8 |
| 60 | 68.9 | 75.0 | 80.4 | 85.1 | 89.3 | 93.1 | 96.5 | 99.5 | 102.3 | 104.8 | 107.2 | 109.3 | 111.3 | 113.1 | 114.8 | 116.4 |
| 70 | 75.0 | 80.4 | 85.1 | 89.3 | 93.1 | 96.5 | 99.5 | 102.3 | 104.8 | 107.2 | 109.3 | 111.3 | 113.1 | 114.8 | 116.4 | 117.9 |
| 80 | 80.4 | 85.1 | 89.3 | 93.1 | 96.5 | 99.5 | 102.3 | 104.8 | 107.2 | 109.3 | 111.3 | 113.1 | 114.8 | 116.4 | 117.9 | 119.3 |
| 90 | 85.1 | 89.3 | 93.1 | 96.5 | 99.5 | 102.3 | 104.8 | 107.2 | 109.3 | 111.3 | 113.1 | 114.8 | 116.4 | 117.9 | 119.3 | 120.6 |
| 100 | 89.3 | 93.1 | 96.5 | 99.5 | 102.3 | 104.8 | 107.2 | 109.3 | 111.3 | 113.1 | 114.8 | 116.4 | 117.9 | 119.3 | 120.6 | 121.8 |
| 110 | 93.1 | 96.5 | 99.5 | 102.3 | 104.8 | 107.2 | 109.3 | 111.3 | 113.1 | 114.8 | 116.4 | 117.9 | 119.3 | 120.6 | 121.8 | 122.9 |
| 120 | 96.5 | 99.5 | 102.3 | 104.8 | 107.2 | 109.3 | 111.3 | 113.1 | 114.8 | 116.4 | 117.9 | 119.3 | 120.6 | 121.8 | 122.9 | 124.0 |
| 130 | 99.5 | 102.3 | 104.8 | 107.2 | 109.3 | 111.3 | 113.1 | 114.8 | 116.4 | 117.9 | 119.3 | 120.6 | 121.8 | 122.9 | 124.0 | 125.0 |
| 140 | 102.3 | 104.8 | 107.2 | 109.3 | 111.3 | 113.1 | 114.8 | 116.4 | 117.9 | 119.3 | 120.6 | 121.8 | 122.9 | 124.0 | 125.0 | 125.0 |
| 150 | 104.8 | 107.2 | 109.3 | 111.3 | 113.1 | 114.8 | 116.4 | 117.9 | 119.3 | 120.6 | 121.8 | 122.9 | 124.0 | 125.0 | 125.0 | 125.0 |

Table 4. Predicted yield of irrigated Durum Wheat under average and optimum growing conditions.

PREDICTED CROP YIELD (BU/AC) TABLE

CROP=DURUM WHEAT | IRRIGATION=AVERAGE

| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 14.1 | 24.1 | 31.7 | 37.7 | 42.4 | 46.3 | 49.6 | 52.3 | 54.7 | 56.7 | 58.5 | 60.1 | 61.5 | 62.8 | 63.9 | 65.0 |
| 20 | 24.1 | 31.7 | 37.7 | 42.4 | 46.3 | 49.6 | 52.3 | 54.7 | 56.7 | 58.5 | 60.1 | 61.5 | 62.8 | 63.9 | 65.0 | 65.0 |
| 30 | 31.7 | 37.7 | 42.4 | 46.3 | 49.6 | 52.3 | 54.7 | 56.7 | 58.5 | 60.1 | 61.5 | 62.8 | 63.9 | 65.0 | 65.0 | 65.0 |
| 40 | 37.7 | 42.4 | 46.3 | 49.6 | 52.3 | 54.7 | 56.7 | 58.5 | 60.1 | 61.5 | 62.8 | 63.9 | 65.0 | 65.0 | 65.0 | 65.0 |
| 50 | 42.4 | 46.3 | 49.6 | 52.3 | 54.7 | 56.7 | 58.5 | 60.1 | 61.5 | 62.8 | 63.9 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 |
| 60 | 46.3 | 49.6 | 52.3 | 54.7 | 56.7 | 58.5 | 60.1 | 61.5 | 62.8 | 63.9 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 |
| 70 | 49.6 | 52.3 | 54.7 | 56.7 | 58.5 | 60.1 | 61.5 | 62.8 | 63.9 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 |
| 80 | 52.3 | 54.7 | 56.7 | 58.5 | 60.1 | 61.5 | 62.8 | 63.9 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 |
| 90 | 54.7 | 56.7 | 58.5 | 60.1 | 61.5 | 62.8 | 63.9 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 |
| 100 | 56.7 | 58.5 | 60.1 | 61.5 | 62.8 | 63.9 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 |
| 110 | 58.5 | 60.1 | 61.5 | 62.8 | 63.9 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 |
| 120 | 60.1 | 61.5 | 62.8 | 63.9 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 |
| 130 | 61.5 | 62.8 | 63.9 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 |
| 140 | 62.8 | 63.9 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 |
| 150 | 63.9 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 | 65.0 |

PREDICTED CROP YIELD (BU/AC) TABLE

CROP=DURUM WHEAT | IRRIGATION=OPTIUM

| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 14.6 | 25.9 | 34.8 | 42.0 | 48.0 | 53.1 | 57.4 | 61.1 | 64.3 | 67.2 | 69.7 | 72.0 | 74.0 | 75.9 | 77.5 | 79.1 |
| 20 | 25.9 | 34.8 | 42.0 | 48.0 | 53.1 | 57.4 | 61.1 | 64.3 | 67.2 | 69.7 | 72.0 | 74.0 | 75.9 | 77.5 | 79.1 | 80.4 |
| 30 | 34.8 | 42.0 | 48.0 | 53.1 | 57.4 | 61.1 | 64.3 | 67.2 | 69.7 | 72.0 | 74.0 | 75.9 | 77.5 | 79.1 | 80.4 | 81.7 |
| 40 | 42.0 | 48.0 | 53.1 | 57.4 | 61.1 | 64.3 | 67.2 | 69.7 | 72.0 | 74.0 | 75.9 | 77.5 | 79.1 | 80.4 | 81.7 | 82.9 |
| 50 | 48.0 | 53.1 | 57.4 | 61.1 | 64.3 | 67.2 | 69.7 | 72.0 | 74.0 | 75.9 | 77.5 | 79.1 | 80.4 | 81.7 | 82.9 | 84.0 |
| 60 | 53.1 | 57.4 | 61.1 | 64.3 | 67.2 | 69.7 | 72.0 | 74.0 | 75.9 | 77.5 | 79.1 | 80.4 | 81.7 | 82.9 | 84.0 | 85.0 |
| 70 | 57.4 | 61.1 | 64.3 | 67.2 | 69.7 | 72.0 | 74.0 | 75.9 | 77.5 | 79.1 | 80.4 | 81.7 | 82.9 | 84.0 | 85.0 | 85.0 |
| 80 | 61.1 | 64.3 | 67.2 | 69.7 | 72.0 | 74.0 | 75.9 | 77.5 | 79.1 | 80.4 | 81.7 | 82.9 | 84.0 | 85.0 | 85.0 | 85.0 |
| 90 | 64.3 | 67.2 | 69.7 | 72.0 | 74.0 | 75.9 | 77.5 | 79.1 | 80.4 | 81.7 | 82.9 | 84.0 | 85.0 | 85.0 | 85.0 | 85.0 |
| 100 | 67.2 | 69.7 | 72.0 | 74.0 | 75.9 | 77.5 | 79.1 | 80.4 | 81.7 | 82.9 | 84.0 | 85.0 | 85.0 | 85.0 | 85.0 | 85.0 |
| 110 | 69.7 | 72.0 | 74.0 | 75.9 | 77.5 | 79.1 | 80.4 | 81.7 | 82.9 | 84.0 | 85.0 | 85.0 | 85.0 | 85.0 | 85.0 | 85.0 |
| 120 | 72.0 | 74.0 | 75.9 | 77.5 | 79.1 | 80.4 | 81.7 | 82.9 | 84.0 | 85.0 | 85.0 | 85.0 | 85.0 | 85.0 | 85.0 | 85.0 |
| 130 | 74.0 | 75.9 | 77.5 | 79.1 | 80.4 | 81.7 | 82.9 | 84.0 | 85.0 | 85.0 | 85.0 | 85.0 | 85.0 | 85.0 | 85.0 | 85.0 |
| 140 | 75.9 | 77.5 | 79.1 | 80.4 | 81.7 | 82.9 | 84.0 | 85.0 | 85.0 | 85.0 | 85.0 | 85.0 | 85.0 | 85.0 | 85.0 | 85.0 |
| 150 | 77.5 | 79.1 | 80.4 | 81.7 | 82.9 | 84.0 | 85.0 | 85.0 | 85.0 | 85.0 | 85.0 | 85.0 | 85.0 | 85.0 | 85.0 | 85.0 |

Table 5. Predicted yield of irrigated Soft White Spring Wheat under average and optimum growing conditions.

PREDICTED CROP YIELD (BU/AC) TABLE

CROP=SOFT WHEAT | IRRIGATION=AVERAGE

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 14.9 | 25.9 | 34.3 | 41.0 | 46.4 | 50.9 | 54.7 | 57.9 | 60.6 | 63.1 | 65.2 | 67.1 | 68.7 | 70.2 | 71.6 | 72.8 |
| 20 | 25.9 | 34.3 | 41.0 | 46.4 | 50.9 | 54.7 | 57.9 | 60.6 | 63.1 | 65.2 | 67.1 | 68.7 | 70.2 | 71.6 | 72.8 | 74.0 |
| 30 | 34.3 | 41.0 | 46.4 | 50.9 | 54.7 | 57.9 | 60.6 | 63.1 | 65.2 | 67.1 | 68.7 | 70.2 | 71.6 | 72.8 | 74.0 | 75.0 |
| 40 | 41.0 | 46.4 | 50.9 | 54.7 | 57.9 | 60.6 | 63.1 | 65.2 | 67.1 | 68.7 | 70.2 | 71.6 | 72.8 | 74.0 | 75.0 | 75.0 |
| 50 | 46.4 | 50.9 | 54.7 | 57.9 | 60.6 | 63.1 | 65.2 | 67.1 | 68.7 | 70.2 | 71.6 | 72.8 | 74.0 | 75.0 | 75.0 | 75.0 |
| 60 | 50.9 | 54.7 | 57.9 | 60.6 | 63.1 | 65.2 | 67.1 | 68.7 | 70.2 | 71.6 | 72.8 | 74.0 | 75.0 | 75.0 | 75.0 | 75.0 |
| 70 | 54.7 | 57.9 | 60.6 | 63.1 | 65.2 | 67.1 | 68.7 | 70.2 | 71.6 | 72.8 | 74.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 |
| 80 | 57.9 | 60.6 | 63.1 | 65.2 | 67.1 | 68.7 | 70.2 | 71.6 | 72.8 | 74.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 |
| 90 | 60.6 | 63.1 | 65.2 | 67.1 | 68.7 | 70.2 | 71.6 | 72.8 | 74.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 |
| 100 | 63.1 | 65.2 | 67.1 | 68.7 | 70.2 | 71.6 | 72.8 | 74.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 |
| 110 | 65.2 | 67.1 | 68.7 | 70.2 | 71.6 | 72.8 | 74.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 |
| 120 | 67.1 | 68.7 | 70.2 | 71.6 | 72.8 | 74.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 |
| 130 | 68.7 | 70.2 | 71.6 | 72.8 | 74.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 |
| 140 | 70.2 | 71.6 | 72.8 | 74.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 |
| 150 | 71.6 | 72.8 | 74.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 |

PREDICTED CROP YIELD (BU/AC) TABLE

CROP=SOFT WHEAT | IRRIGATION=OPTIUM

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 15.8 | 28.5 | 39.1 | 48.0 | 55.6 | 62.2 | 67.9 | 72.9 | 77.4 | 81.4 | 84.9 | 88.2 | 91.1 | 93.8 | 96.2 | 98.4 |
| 20 | 28.5 | 39.1 | 48.0 | 55.6 | 62.2 | 67.9 | 72.9 | 77.4 | 81.4 | 84.9 | 88.2 | 91.1 | 93.8 | 96.2 | 98.4 | 100.5 |
| 30 | 39.1 | 48.0 | 55.6 | 62.2 | 67.9 | 72.9 | 77.4 | 81.4 | 84.9 | 88.2 | 91.1 | 93.8 | 96.2 | 98.4 | 100.5 | 102.4 |
| 40 | 48.0 | 55.6 | 62.2 | 67.9 | 72.9 | 77.4 | 81.4 | 84.9 | 88.2 | 91.1 | 93.8 | 96.2 | 98.4 | 100.5 | 102.4 | 104.2 |
| 50 | 55.6 | 62.2 | 67.9 | 72.9 | 77.4 | 81.4 | 84.9 | 88.2 | 91.1 | 93.8 | 96.2 | 98.4 | 100.5 | 102.4 | 104.2 | 105.8 |
| 60 | 62.2 | 67.9 | 72.9 | 77.4 | 81.4 | 84.9 | 88.2 | 91.1 | 93.8 | 96.2 | 98.4 | 100.5 | 102.4 | 104.2 | 105.8 | 107.4 |
| 70 | 67.9 | 72.9 | 77.4 | 81.4 | 84.9 | 88.2 | 91.1 | 93.8 | 96.2 | 98.4 | 100.5 | 102.4 | 104.2 | 105.8 | 107.4 | 108.8 |
| 80 | 72.9 | 77.4 | 81.4 | 84.9 | 88.2 | 91.1 | 93.8 | 96.2 | 98.4 | 100.5 | 102.4 | 104.2 | 105.8 | 107.4 | 108.8 | 110.2 |
| 90 | 77.4 | 81.4 | 84.9 | 88.2 | 91.1 | 93.8 | 96.2 | 98.4 | 100.5 | 102.4 | 104.2 | 105.8 | 107.4 | 108.8 | 110.2 | 111.4 |
| 100 | 81.4 | 84.9 | 88.2 | 91.1 | 93.8 | 96.2 | 98.4 | 100.5 | 102.4 | 104.2 | 105.8 | 107.4 | 108.8 | 110.2 | 111.4 | 112.6 |
| 110 | 84.9 | 88.2 | 91.1 | 93.8 | 96.2 | 98.4 | 100.5 | 102.4 | 104.2 | 105.8 | 107.4 | 108.8 | 110.2 | 111.4 | 112.6 | 113.7 |
| 120 | 88.2 | 91.1 | 93.8 | 96.2 | 98.4 | 100.5 | 102.4 | 104.2 | 105.8 | 107.4 | 108.8 | 110.2 | 111.4 | 112.6 | 113.7 | 114.8 |
| 130 | 91.1 | 93.8 | 96.2 | 98.4 | 100.5 | 102.4 | 104.2 | 105.8 | 107.4 | 108.8 | 110.2 | 111.4 | 112.6 | 113.7 | 114.8 | 114.8 |
| 140 | 93.8 | 96.2 | 98.4 | 100.5 | 102.4 | 104.2 | 105.8 | 107.4 | 108.8 | 110.2 | 111.4 | 112.6 | 113.7 | 114.8 | 114.8 | 114.8 |
| 150 | 96.2 | 98.4 | 100.5 | 102.4 | 104.2 | 105.8 | 107.4 | 108.8 | 110.2 | 111.4 | 112.6 | 113.7 | 114.8 | 114.8 | 114.8 | 114.8 |

Table 6. Predicted yield of irrigated Hard Red Spring Wheat under average and optimum growing conditions.

PREDICTED CROP YIELD (BU/AC) TABLE

CROP=HRS WHEAT | IRRIGATION=AVERAGE

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 14.0 | 23.7 | 30.9 | 36.5 | 40.8 | 44.4 | 47.4 | 49.9 | 52.0 | 53.8 | 55.4 | 56.8 | 58.1 | 59.2 | 60.2 | 60.2 |
| 20 | 23.7 | 30.9 | 36.5 | 40.8 | 44.4 | 47.4 | 49.9 | 52.0 | 53.8 | 55.4 | 56.8 | 58.1 | 59.2 | 60.2 | 60.2 | 60.2 |
| 30 | 30.9 | 36.5 | 40.8 | 44.4 | 47.4 | 49.9 | 52.0 | 53.8 | 55.4 | 56.8 | 58.1 | 59.2 | 60.2 | 60.2 | 60.2 | 60.2 |
| 40 | 36.5 | 40.8 | 44.4 | 47.4 | 49.9 | 52.0 | 53.8 | 55.4 | 56.8 | 58.1 | 59.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 |
| 50 | 40.8 | 44.4 | 47.4 | 49.9 | 52.0 | 53.8 | 55.4 | 56.8 | 58.1 | 59.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 |
| 60 | 44.4 | 47.4 | 49.9 | 52.0 | 53.8 | 55.4 | 56.8 | 58.1 | 59.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 |
| 70 | 47.4 | 49.9 | 52.0 | 53.8 | 55.4 | 56.8 | 58.1 | 59.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 |
| 80 | 49.9 | 52.0 | 53.8 | 55.4 | 56.8 | 58.1 | 59.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 |
| 90 | 52.0 | 53.8 | 55.4 | 56.8 | 58.1 | 59.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 |
| 100 | 53.8 | 55.4 | 56.8 | 58.1 | 59.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 |
| 110 | 55.4 | 56.8 | 58.1 | 59.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 |
| 120 | 56.8 | 58.1 | 59.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 |
| 130 | 58.1 | 59.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 |
| 140 | 59.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 |
| 150 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 | 60.2 |

PREDICTED CROP YIELD (BU/AC) TABLE

CROP=HRS WHEAT | IRRIGATION=OPTIUM

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 14.6 | 25.7 | 34.4 | 41.4 | 47.1 | 51.9 | 56.0 | 59.5 | 62.6 | 65.2 | 67.6 | 69.7 | 71.6 | 73.3 | 74.8 | 76.2 |
| 20 | 25.7 | 34.4 | 41.4 | 47.1 | 51.9 | 56.0 | 59.5 | 62.6 | 65.2 | 67.6 | 69.7 | 71.6 | 73.3 | 74.8 | 76.2 | 77.5 |
| 30 | 34.4 | 41.4 | 47.1 | 51.9 | 56.0 | 59.5 | 62.6 | 65.2 | 67.6 | 69.7 | 71.6 | 73.3 | 74.8 | 76.2 | 77.5 | 78.7 |
| 40 | 41.4 | 47.1 | 51.9 | 56.0 | 59.5 | 62.6 | 65.2 | 67.6 | 69.7 | 71.6 | 73.3 | 74.8 | 76.2 | 77.5 | 78.7 | 79.8 |
| 50 | 47.1 | 51.9 | 56.0 | 59.5 | 62.6 | 65.2 | 67.6 | 69.7 | 71.6 | 73.3 | 74.8 | 76.2 | 77.5 | 78.7 | 79.8 | 80.8 |
| 60 | 51.9 | 56.0 | 59.5 | 62.6 | 65.2 | 67.6 | 69.7 | 71.6 | 73.3 | 74.8 | 76.2 | 77.5 | 78.7 | 79.8 | 80.8 | 80.8 |
| 70 | 56.0 | 59.5 | 62.6 | 65.2 | 67.6 | 69.7 | 71.6 | 73.3 | 74.8 | 76.2 | 77.5 | 78.7 | 79.8 | 80.8 | 80.8 | 80.8 |
| 80 | 59.5 | 62.6 | 65.2 | 67.6 | 69.7 | 71.6 | 73.3 | 74.8 | 76.2 | 77.5 | 78.7 | 79.8 | 80.8 | 80.8 | 80.8 | 80.8 |
| 90 | 62.6 | 65.2 | 67.6 | 69.7 | 71.6 | 73.3 | 74.8 | 76.2 | 77.5 | 78.7 | 79.8 | 80.8 | 80.8 | 80.8 | 80.8 | 80.8 |
| 100 | 65.2 | 67.6 | 69.7 | 71.6 | 73.3 | 74.8 | 76.2 | 77.5 | 78.7 | 79.8 | 80.8 | 80.8 | 80.8 | 80.8 | 80.8 | 80.8 |
| 110 | 67.6 | 69.7 | 71.6 | 73.3 | 74.8 | 76.2 | 77.5 | 78.7 | 79.8 | 80.8 | 80.8 | 80.8 | 80.8 | 80.8 | 80.8 | 80.8 |
| 120 | 69.7 | 71.6 | 73.3 | 74.8 | 76.2 | 77.5 | 78.7 | 79.8 | 80.8 | 80.8 | 80.8 | 80.8 | 80.8 | 80.8 | 80.8 | 80.8 |
| 130 | 71.6 | 73.3 | 74.8 | 76.2 | 77.5 | 78.7 | 79.8 | 80.8 | 80.8 | 80.8 | 80.8 | 80.8 | 80.8 | 80.8 | 80.8 | 80.8 |
| 140 | 73.3 | 74.8 | 76.2 | 77.5 | 78.7 | 79.8 | 80.8 | 80.8 | 80.8 | 80.8 | 80.8 | 80.8 | 80.8 | 80.8 | 80.8 | 80.8 |
| 150 | 74.8 | 76.2 | 77.5 | 78.7 | 79.8 | 80.8 | 80.8 | 80.8 | 80.8 | 80.8 | 80.8 | 80.8 | 80.8 | 80.8 | 80.8 | 80.8 |

Table 7. Predicted yield of irrigated 3M Wheat under average and optimum growing conditions.

PREDICTED CROP YIELD (BU/AC) TABLE

CROP=3M WHEAT | IRRIGATION=AVERAGE

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 15.1 | 26.2 | 34.6 | 41.3 | 46.7 | 51.1 | 54.9 | 58.1 | 60.8 | 63.2 | 65.3 | 67.2 | 68.9 | 70.3 | 71.7 | 72.9 |
| 20 | 26.2 | 34.6 | 41.3 | 46.7 | 51.1 | 54.9 | 58.1 | 60.8 | 63.2 | 65.3 | 67.2 | 68.9 | 70.3 | 71.7 | 72.9 | 74.0 |
| 30 | 34.6 | 41.3 | 46.7 | 51.1 | 54.9 | 58.1 | 60.8 | 63.2 | 65.3 | 67.2 | 68.9 | 70.3 | 71.7 | 72.9 | 74.0 | 75.0 |
| 40 | 41.3 | 46.7 | 51.1 | 54.9 | 58.1 | 60.8 | 63.2 | 65.3 | 67.2 | 68.9 | 70.3 | 71.7 | 72.9 | 74.0 | 75.0 | 75.0 |
| 50 | 46.7 | 51.1 | 54.9 | 58.1 | 60.8 | 63.2 | 65.3 | 67.2 | 68.9 | 70.3 | 71.7 | 72.9 | 74.0 | 75.0 | 75.0 | 75.0 |
| 60 | 51.1 | 54.9 | 58.1 | 60.8 | 63.2 | 65.3 | 67.2 | 68.9 | 70.3 | 71.7 | 72.9 | 74.0 | 75.0 | 75.0 | 75.0 | 75.0 |
| 70 | 54.9 | 58.1 | 60.8 | 63.2 | 65.3 | 67.2 | 68.9 | 70.3 | 71.7 | 72.9 | 74.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 |
| 80 | 58.1 | 60.8 | 63.2 | 65.3 | 67.2 | 68.9 | 70.3 | 71.7 | 72.9 | 74.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 |
| 90 | 60.8 | 63.2 | 65.3 | 67.2 | 68.9 | 70.3 | 71.7 | 72.9 | 74.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 |
| 100 | 63.2 | 65.3 | 67.2 | 68.9 | 70.3 | 71.7 | 72.9 | 74.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 |
| 110 | 65.3 | 67.2 | 68.9 | 70.3 | 71.7 | 72.9 | 74.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 |
| 120 | 67.2 | 68.9 | 70.3 | 71.7 | 72.9 | 74.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 |
| 130 | 68.9 | 70.3 | 71.7 | 72.9 | 74.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 |
| 140 | 70.3 | 71.7 | 72.9 | 74.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 |
| 150 | 71.7 | 72.9 | 74.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 |

PREDICTED CROP YIELD (BU/AC) TABLE

CROP=3M WHEAT | IRRIGATION=OPTIUM

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 16.2 | 29.8 | 41.3 | 51.2 | 59.7 | 67.2 | 73.8 | 79.7 | 85.0 | 89.7 | 94.0 | 98.0 | 101.5 | 104.8 | 107.8 | 110.6 |
| 20 | 29.8 | 41.3 | 51.2 | 59.7 | 67.2 | 73.8 | 79.7 | 85.0 | 89.7 | 94.0 | 98.0 | 101.5 | 104.8 | 107.8 | 110.6 | 113.2 |
| 30 | 41.3 | 51.2 | 59.7 | 67.2 | 73.8 | 79.7 | 85.0 | 89.7 | 94.0 | 98.0 | 101.5 | 104.8 | 107.8 | 110.6 | 113.2 | 115.6 |
| 40 | 51.2 | 59.7 | 67.2 | 73.8 | 79.7 | 85.0 | 89.7 | 94.0 | 98.0 | 101.5 | 104.8 | 107.8 | 110.6 | 113.2 | 115.6 | 117.8 |
| 50 | 59.7 | 67.2 | 73.8 | 79.7 | 85.0 | 89.7 | 94.0 | 98.0 | 101.5 | 104.8 | 107.8 | 110.6 | 113.2 | 115.6 | 117.8 | 119.9 |
| 60 | 67.2 | 73.8 | 79.7 | 85.0 | 89.7 | 94.0 | 98.0 | 101.5 | 104.8 | 107.8 | 110.6 | 113.2 | 115.6 | 117.8 | 119.9 | 121.8 |
| 70 | 73.8 | 79.7 | 85.0 | 89.7 | 94.0 | 98.0 | 101.5 | 104.8 | 107.8 | 110.6 | 113.2 | 115.6 | 117.8 | 119.9 | 121.8 | 123.7 |
| 80 | 79.7 | 85.0 | 89.7 | 94.0 | 98.0 | 101.5 | 104.8 | 107.8 | 110.6 | 113.2 | 115.6 | 117.8 | 119.9 | 121.8 | 123.7 | 125.4 |
| 90 | 85.0 | 89.7 | 94.0 | 98.0 | 101.5 | 104.8 | 107.8 | 110.6 | 113.2 | 115.6 | 117.8 | 119.9 | 121.8 | 123.7 | 125.4 | 127.0 |
| 100 | 89.7 | 94.0 | 98.0 | 101.5 | 104.8 | 107.8 | 110.6 | 113.2 | 115.6 | 117.8 | 119.9 | 121.8 | 123.7 | 125.4 | 127.0 | 128.5 |
| 110 | 94.0 | 98.0 | 101.5 | 104.8 | 107.8 | 110.6 | 113.2 | 115.6 | 117.8 | 119.9 | 121.8 | 123.7 | 125.4 | 127.0 | 128.5 | 130.0 |
| 120 | 98.0 | 101.5 | 104.8 | 107.8 | 110.6 | 113.2 | 115.6 | 117.8 | 119.9 | 121.8 | 123.7 | 125.4 | 127.0 | 128.5 | 130.0 | 131.3 |
| 130 | 101.5 | 104.8 | 107.8 | 110.6 | 113.2 | 115.6 | 117.8 | 119.9 | 121.8 | 123.7 | 125.4 | 127.0 | 128.5 | 130.0 | 131.3 | 132.6 |
| 140 | 104.8 | 107.8 | 110.6 | 113.2 | 115.6 | 117.8 | 119.9 | 121.8 | 123.7 | 125.4 | 127.0 | 128.5 | 130.0 | 131.3 | 132.6 | 133.8 |
| 150 | 107.8 | 110.6 | 113.2 | 115.6 | 117.8 | 119.9 | 121.8 | 123.7 | 125.4 | 127.0 | 128.5 | 130.0 | 131.3 | 132.6 | 133.8 | 135.0 |

Table 8. Predicted yield of irrigated Oats under average and optimum growing conditions.

PREDICTED CROP YIELD (BU/AC) TABLE

CROP=OATS | IRRIGATION=AVERAGE

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 18.9 | 32.4 | 42.5 | 50.4 | 56.7 | 61.9 | 66.2 | 69.9 | 73.0 | 75.7 | 78.1 | 80.2 | 82.1 | 83.8 | 85.3 | 86.6 |
| 20 | 32.4 | 42.5 | 50.4 | 56.7 | 61.9 | 66.2 | 69.9 | 73.0 | 75.7 | 78.1 | 80.2 | 82.1 | 83.8 | 85.3 | 86.6 | 87.9 |
| 30 | 42.5 | 50.4 | 56.7 | 61.9 | 66.2 | 69.9 | 73.0 | 75.7 | 78.1 | 80.2 | 82.1 | 83.8 | 85.3 | 86.6 | 87.9 | 89.0 |
| 40 | 50.4 | 56.7 | 61.9 | 66.2 | 69.9 | 73.0 | 75.7 | 78.1 | 80.2 | 82.1 | 83.8 | 85.3 | 86.6 | 87.9 | 89.0 | 90.0 |
| 50 | 56.7 | 61.9 | 66.2 | 69.9 | 73.0 | 75.7 | 78.1 | 80.2 | 82.1 | 83.8 | 85.3 | 86.6 | 87.9 | 89.0 | 90.0 | 90.0 |
| 60 | 61.9 | 66.2 | 69.9 | 73.0 | 75.7 | 78.1 | 80.2 | 82.1 | 83.8 | 85.3 | 86.6 | 87.9 | 89.0 | 90.0 | 90.0 | 90.0 |
| 70 | 66.2 | 69.9 | 73.0 | 75.7 | 78.1 | 80.2 | 82.1 | 83.8 | 85.3 | 86.6 | 87.9 | 89.0 | 90.0 | 90.0 | 90.0 | 90.0 |
| 80 | 69.9 | 73.0 | 75.7 | 78.1 | 80.2 | 82.1 | 83.8 | 85.3 | 86.6 | 87.9 | 89.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 |
| 90 | 73.0 | 75.7 | 78.1 | 80.2 | 82.1 | 83.8 | 85.3 | 86.6 | 87.9 | 89.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 |
| 100 | 75.7 | 78.1 | 80.2 | 82.1 | 83.8 | 85.3 | 86.6 | 87.9 | 89.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 |
| 110 | 78.1 | 80.2 | 82.1 | 83.8 | 85.3 | 86.6 | 87.9 | 89.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 |
| 120 | 80.2 | 82.1 | 83.8 | 85.3 | 86.6 | 87.9 | 89.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 |
| 130 | 82.1 | 83.8 | 85.3 | 86.6 | 87.9 | 89.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 |
| 140 | 83.8 | 85.3 | 86.6 | 87.9 | 89.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 |
| 150 | 85.3 | 86.6 | 87.9 | 89.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 | 90.0 |

PREDICTED CROP YIELD (BU/AC) TABLE

CROP=OATS | IRRIGATION=OPTIUM

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 20.1 | 36.3 | 49.6 | 60.7 | 70.1 | 78.2 | 85.2 | 91.3 | 96.8 | 101.6 | 105.9 | 109.8 | 113.3 | 116.5 | 119.5 | 122.2 |
| 20 | 36.3 | 49.6 | 60.7 | 70.1 | 78.2 | 85.2 | 91.3 | 96.8 | 101.6 | 105.9 | 109.8 | 113.3 | 116.5 | 119.5 | 122.2 | 124.6 |
| 30 | 49.6 | 60.7 | 70.1 | 78.2 | 85.2 | 91.3 | 96.8 | 101.6 | 105.9 | 109.8 | 113.3 | 116.5 | 119.5 | 122.2 | 124.6 | 126.9 |
| 40 | 60.7 | 70.1 | 78.2 | 85.2 | 91.3 | 96.8 | 101.6 | 105.9 | 109.8 | 113.3 | 116.5 | 119.5 | 122.2 | 124.6 | 126.9 | 129.0 |
| 50 | 70.1 | 78.2 | 85.2 | 91.3 | 96.8 | 101.6 | 105.9 | 109.8 | 113.3 | 116.5 | 119.5 | 122.2 | 124.6 | 126.9 | 129.0 | 131.0 |
| 60 | 78.2 | 85.2 | 91.3 | 96.8 | 101.6 | 105.9 | 109.8 | 113.3 | 116.5 | 119.5 | 122.2 | 124.6 | 126.9 | 129.0 | 131.0 | 132.8 |
| 70 | 85.2 | 91.3 | 96.8 | 101.6 | 105.9 | 109.8 | 113.3 | 116.5 | 119.5 | 122.2 | 124.6 | 126.9 | 129.0 | 131.0 | 132.8 | 134.5 |
| 80 | 91.3 | 96.8 | 101.6 | 105.9 | 109.8 | 113.3 | 116.5 | 119.5 | 122.2 | 124.6 | 126.9 | 129.0 | 131.0 | 132.8 | 134.5 | 136.1 |
| 90 | 96.8 | 101.6 | 105.9 | 109.8 | 113.3 | 116.5 | 119.5 | 122.2 | 124.6 | 126.9 | 129.0 | 131.0 | 132.8 | 134.5 | 136.1 | 137.6 |
| 100 | 101.6 | 105.9 | 109.8 | 113.3 | 116.5 | 119.5 | 122.2 | 124.6 | 126.9 | 129.0 | 131.0 | 132.8 | 134.5 | 136.1 | 137.6 | 139.1 |
| 110 | 105.9 | 109.8 | 113.3 | 116.5 | 119.5 | 122.2 | 124.6 | 126.9 | 129.0 | 131.0 | 132.8 | 134.5 | 136.1 | 137.6 | 139.1 | 140.4 |
| 120 | 109.8 | 113.3 | 116.5 | 119.5 | 122.2 | 124.6 | 126.9 | 129.0 | 131.0 | 132.8 | 134.5 | 136.1 | 137.6 | 139.1 | 140.4 | 141.6 |
| 130 | 113.3 | 116.5 | 119.5 | 122.2 | 124.6 | 126.9 | 129.0 | 131.0 | 132.8 | 134.5 | 136.1 | 137.6 | 139.1 | 140.4 | 141.6 | 142.8 |
| 140 | 116.5 | 119.5 | 122.2 | 124.6 | 126.9 | 129.0 | 131.0 | 132.8 | 134.5 | 136.1 | 137.6 | 139.1 | 140.4 | 141.6 | 142.8 | 143.9 |
| 150 | 119.5 | 122.2 | 124.6 | 126.9 | 129.0 | 131.0 | 132.8 | 134.5 | 136.1 | 137.6 | 139.1 | 140.4 | 141.6 | 142.8 | 143.9 | 145.0 |

Table 9. Predicted yield of irrigated Canola under average and optimum growing conditions.

PREDICTED CROP YIELD (BU/AC) TABLE

CROP=CANOLA | IRRIGATION=AVERAGE

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 7.9 | 14.3 | 19.6 | 24.1 | 27.8 | 31.1 | 33.9 | 36.4 | 38.6 | 40.6 | 42.4 | 44.0 | 45.4 | 46.7 | 47.9 | 49.0 |
| 20 | 14.3 | 19.6 | 24.1 | 27.8 | 31.1 | 33.9 | 36.4 | 38.6 | 40.6 | 42.4 | 44.0 | 45.4 | 46.7 | 47.9 | 49.0 | 50.0 |
| 30 | 19.6 | 24.1 | 27.8 | 31.1 | 33.9 | 36.4 | 38.6 | 40.6 | 42.4 | 44.0 | 45.4 | 46.7 | 47.9 | 49.0 | 50.0 | 50.0 |
| 40 | 24.1 | 27.8 | 31.1 | 33.9 | 36.4 | 38.6 | 40.6 | 42.4 | 44.0 | 45.4 | 46.7 | 47.9 | 49.0 | 50.0 | 50.0 | 50.0 |
| 50 | 27.8 | 31.1 | 33.9 | 36.4 | 38.6 | 40.6 | 42.4 | 44.0 | 45.4 | 46.7 | 47.9 | 49.0 | 50.0 | 50.0 | 50.0 | 50.0 |
| 60 | 31.1 | 33.9 | 36.4 | 38.6 | 40.6 | 42.4 | 44.0 | 45.4 | 46.7 | 47.9 | 49.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 |
| 70 | 33.9 | 36.4 | 38.6 | 40.6 | 42.4 | 44.0 | 45.4 | 46.7 | 47.9 | 49.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 |
| 80 | 36.4 | 38.6 | 40.6 | 42.4 | 44.0 | 45.4 | 46.7 | 47.9 | 49.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 |
| 90 | 38.6 | 40.6 | 42.4 | 44.0 | 45.4 | 46.7 | 47.9 | 49.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 |
| 100 | 40.6 | 42.4 | 44.0 | 45.4 | 46.7 | 47.9 | 49.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 |
| 110 | 42.4 | 44.0 | 45.4 | 46.7 | 47.9 | 49.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 |
| 120 | 44.0 | 45.4 | 46.7 | 47.9 | 49.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 |
| 130 | 45.4 | 46.7 | 47.9 | 49.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 |
| 140 | 46.7 | 47.9 | 49.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 |
| 150 | 47.9 | 49.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 | 50.0 |

PREDICTED CROP YIELD (BU/AC) TABLE

CROP=CANOLA | IRRIGATION=OPTIUM

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 8.2 | 15.3 | 21.5 | 27.0 | 31.9 | 36.2 | 40.1 | 43.6 | 46.8 | 49.7 | 52.4 | 54.9 | 57.1 | 59.2 | 61.2 | 63.0 |
| 20 | 15.3 | 21.5 | 27.0 | 31.9 | 36.2 | 40.1 | 43.6 | 46.8 | 49.7 | 52.4 | 54.9 | 57.1 | 59.2 | 61.2 | 63.0 | 64.7 |
| 30 | 21.5 | 27.0 | 31.9 | 36.2 | 40.1 | 43.6 | 46.8 | 49.7 | 52.4 | 54.9 | 57.1 | 59.2 | 61.2 | 63.0 | 64.7 | 66.3 |
| 40 | 27.0 | 31.9 | 36.2 | 40.1 | 43.6 | 46.8 | 49.7 | 52.4 | 54.9 | 57.1 | 59.2 | 61.2 | 63.0 | 64.7 | 66.3 | 67.7 |
| 50 | 31.9 | 36.2 | 40.1 | 43.6 | 46.8 | 49.7 | 52.4 | 54.9 | 57.1 | 59.2 | 61.2 | 63.0 | 64.7 | 66.3 | 67.7 | 69.1 |
| 60 | 36.2 | 40.1 | 43.6 | 46.8 | 49.7 | 52.4 | 54.9 | 57.1 | 59.2 | 61.2 | 63.0 | 64.7 | 66.3 | 67.7 | 69.1 | 70.4 |
| 70 | 40.1 | 43.6 | 46.8 | 49.7 | 52.4 | 54.9 | 57.1 | 59.2 | 61.2 | 63.0 | 64.7 | 66.3 | 67.7 | 69.1 | 70.4 | 71.7 |
| 80 | 43.6 | 46.8 | 49.7 | 52.4 | 54.9 | 57.1 | 59.2 | 61.2 | 63.0 | 64.7 | 66.3 | 67.7 | 69.1 | 70.4 | 71.7 | 72.8 |
| 90 | 46.8 | 49.7 | 52.4 | 54.9 | 57.1 | 59.2 | 61.2 | 63.0 | 64.7 | 66.3 | 67.7 | 69.1 | 70.4 | 71.7 | 72.8 | 73.9 |
| 100 | 49.7 | 52.4 | 54.9 | 57.1 | 59.2 | 61.2 | 63.0 | 64.7 | 66.3 | 67.7 | 69.1 | 70.4 | 71.7 | 72.8 | 73.9 | 75.0 |
| 110 | 52.4 | 54.9 | 57.1 | 59.2 | 61.2 | 63.0 | 64.7 | 66.3 | 67.7 | 69.1 | 70.4 | 71.7 | 72.8 | 73.9 | 75.0 | 75.0 |
| 120 | 54.9 | 57.1 | 59.2 | 61.2 | 63.0 | 64.7 | 66.3 | 67.7 | 69.1 | 70.4 | 71.7 | 72.8 | 73.9 | 75.0 | 75.0 | 75.0 |
| 130 | 57.1 | 59.2 | 61.2 | 63.0 | 64.7 | 66.3 | 67.7 | 69.1 | 70.4 | 71.7 | 72.8 | 73.9 | 75.0 | 75.0 | 75.0 | 75.0 |
| 140 | 59.2 | 61.2 | 63.0 | 64.7 | 66.3 | 67.7 | 69.1 | 70.4 | 71.7 | 72.8 | 73.9 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 |
| 150 | 61.2 | 63.0 | 64.7 | 66.3 | 67.7 | 69.1 | 70.4 | 71.7 | 72.8 | 73.9 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 | 75.0 |

Table 10. Predicted yield of irrigated Flax under average and optimum growing conditions.

PREDICTED CROP YIELD (BU/AC) TABLE

CROP=FLAX | IRRIGATION=AVERAGE

| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 7.9 | 13.9 | 18.7 | 22.6 | 25.9 | 28.6 | 31.0 | 33.0 | 34.7 | 36.3 | 37.7 | 38.9 | 40.0 | 40.0 | 40.0 | 40.0 |
| 20 | 13.9 | 18.7 | 22.6 | 25.9 | 28.6 | 31.0 | 33.0 | 34.7 | 36.3 | 37.7 | 38.9 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 |
| 30 | 18.7 | 22.6 | 25.9 | 28.6 | 31.0 | 33.0 | 34.7 | 36.3 | 37.7 | 38.9 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 |
| 40 | 22.6 | 25.9 | 28.6 | 31.0 | 33.0 | 34.7 | 36.3 | 37.7 | 38.9 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 |
| 50 | 25.9 | 28.6 | 31.0 | 33.0 | 34.7 | 36.3 | 37.7 | 38.9 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 |
| 60 | 28.6 | 31.0 | 33.0 | 34.7 | 36.3 | 37.7 | 38.9 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 |
| 70 | 31.0 | 33.0 | 34.7 | 36.3 | 37.7 | 38.9 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 |
| 80 | 33.0 | 34.7 | 36.3 | 37.7 | 38.9 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 |
| 90 | 34.7 | 36.3 | 37.7 | 38.9 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 |
| 100 | 36.3 | 37.7 | 38.9 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 |
| 110 | 37.7 | 38.9 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 |
| 120 | 38.9 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 |
| 130 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 |
| 140 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 |
| 150 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 | 40.0 |

PREDICTED CROP YIELD (BU/AC) TABLE

CROP=FLAX | IRRIGATION=OPTIUM

| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 8.1 | 14.5 | 19.9 | 24.3 | 28.1 | 31.3 | 34.2 | 36.6 | 38.8 | 40.8 | 42.5 | 44.1 | 45.5 | 46.8 | 48.0 | 49.1 |
| 20 | 14.5 | 19.9 | 24.3 | 28.1 | 31.3 | 34.2 | 36.6 | 38.8 | 40.8 | 42.5 | 44.1 | 45.5 | 46.8 | 48.0 | 49.1 | 50.1 |
| 30 | 19.9 | 24.3 | 28.1 | 31.3 | 34.2 | 36.6 | 38.8 | 40.8 | 42.5 | 44.1 | 45.5 | 46.8 | 48.0 | 49.1 | 50.1 | 50.1 |
| 40 | 24.3 | 28.1 | 31.3 | 34.2 | 36.6 | 38.8 | 40.8 | 42.5 | 44.1 | 45.5 | 46.8 | 48.0 | 49.1 | 50.1 | 50.1 | 50.1 |
| 50 | 28.1 | 31.3 | 34.2 | 36.6 | 38.8 | 40.8 | 42.5 | 44.1 | 45.5 | 46.8 | 48.0 | 49.1 | 50.1 | 50.1 | 50.1 | 50.1 |
| 60 | 31.3 | 34.2 | 36.6 | 38.8 | 40.8 | 42.5 | 44.1 | 45.5 | 46.8 | 48.0 | 49.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 |
| 70 | 34.2 | 36.6 | 38.8 | 40.8 | 42.5 | 44.1 | 45.5 | 46.8 | 48.0 | 49.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 |
| 80 | 36.6 | 38.8 | 40.8 | 42.5 | 44.1 | 45.5 | 46.8 | 48.0 | 49.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 |
| 90 | 38.8 | 40.8 | 42.5 | 44.1 | 45.5 | 46.8 | 48.0 | 49.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 |
| 100 | 40.8 | 42.5 | 44.1 | 45.5 | 46.8 | 48.0 | 49.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 |
| 110 | 42.5 | 44.1 | 45.5 | 46.8 | 48.0 | 49.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 |
| 120 | 44.1 | 45.5 | 46.8 | 48.0 | 49.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 |
| 130 | 45.5 | 46.8 | 48.0 | 49.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 |
| 140 | 46.8 | 48.0 | 49.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 |
| 150 | 48.0 | 49.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 | 50.1 |

Table 11. Yield response equation[1] coefficients for various irrigated crops as a function of nitrogen supply.

| Crop | Irrigation | $b_o$ | $b_1$ | Imperial Conversion | $R^2$ |
|---|---|---|---|---|---|
| Feed Barley | Average | 10.051 | 0.18222 | 0.0186 | .95 |
| | Optimum | 10.051 | 0.10790 | 0.0186 | |
| Malt Barley | Average | 10.360 | 0.19350 | 0.0186 | .76 |
| | Optimum | 10.360 | 0.11575 | 0.0186 | |
| Durum Wheat | Average | 9.924 | 0.17400 | 0.0149 | .78 |
| | Optimum | 9.924 | 0.18800 | 0.0149 | |
| Soft Wheat | Average | 9.488 | 0.15160 | 0.0149 | .81 |
| | Optimum | 9.488 | 0.09841 | 0.0149 | |
| Hard Spring Wheat | Average | 9.844 | 0.18903 | 0.0149 | .83 |
| | Optimum | 9.844 | 0.14054 | 0.0149 | |
| 3M Wheat | Average | 9.349 | 0.15220 | 0.0149 | .66 |
| | Optimum | 9.349 | 0.08255 | 0.0149 | |
| Canola | Average | 22.500 | 0.23750 | 0.0178 | .76 |
| | Optimum | 22.500 | 0.15700 | 0.0178 | |
| Flax | Average | 19.713 | 0.26200 | 0.0159 | .73 |
| | Optimum | 19.713 | 0.21400 | 0.0159 | |

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[1] $Y = A(Ns)/b_o + b_1 (Ns)$

$Y$ = yield (kg/ha)

$A = 1000$

$Ns$ = Nitrogen Supply (kg/ha) = $NO_3$-N (0-60 cm) + Fertilizer N

$b_o$, $b_1$ = equation coefficients

Dramatic yield increases occurred when N fertilizer was applied on N deficient soils. These studies demonstrated that large yields are possible when adequate levels of N and P are supplied. Realistic maximum yield potentials for farmers are considered to be: soft wheat-115 bu/ac, hard wheat-80 bu/ac, durum wheat-85 bu/ac, 3M wheat-135 bu/ac, malt and feed barley-125 to 140 bu/ac, canola-65 bu/ac and flax-50 bu/ac. The maximum economic yield potential however, will depend on the cost of nitrogen fertilizer and the value of the crop.

The protein content of small grains increased with increasing N rate. From a quality standpoint, this was only a concern for soft wheat and malting barley. With good irrigation management, protein contents in soft wheat were frequently kept under 11.5%. Table 12 shows the range of protein levels for the small grain crops.

Table 12. Percent protein levels of small grains as affected by nitrogen fertilizer application .

| Crop | Range of Low Protein Levels (No N applied) % | Range of High Protein Levels (240 kg/ha of N applied) % | Average Protein Difference % |
|---|---|---|---|
| Soft Wheat | 8 - 10 | 10 - 13 | 3 |
| Hard Wheat | 10 - 12 | 16 - 17 | 5 |
| Durum Wheat | 10 - 13 | 15 - 18 | 5 |
| 3M Wheat | 8.5 - 10 | 12 - 13 | 4 |
| Barley | 8.5 - 10 | 12 - 14 | 3 |

Both canola and flax responded positively to nitrogen. As N rates were increased seed protein content increased and oil contents decreased (Figure 2). Table 13 shows the range of protein levels and oil in canola and flax.

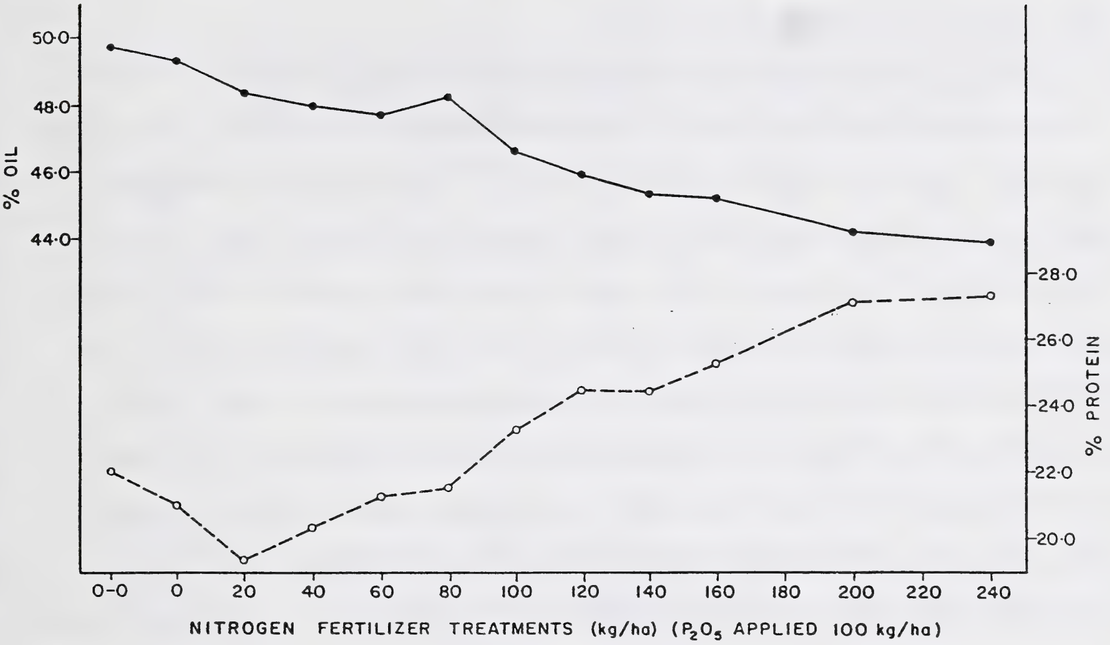

Figure 2. Effect of N fertilizer on protein and oil content of irrigated canola.

Table 13. Percent protein and oil levels of canola and flax as affected by nitrogen fertilizer application.

| Crop | Range of Low Protein Levels (No N applied) % | Range of High Protein Levels (240 kg/ha) of N applied % | Average Protein Difference % | Range of High Oil Levels (No N applied) % | Range of Low Oil Levels (240 kg/ha of N Applied) % | Average Oil Difference % |
|---|---|---|---|---|---|---|
| Canola | 17 - 22% | 23 - 27% | +5 | 50 - 53% | 45 - 49% | -5 |
| Flax* | 17 | 23 | +5 | 48% | 45% | -3 |

* one site information only.

### 4.1.1 Use of Nitrogen Response Charts

The amount of nitrogen fertilizer required by a crop for maximum economic yield can be calculated using the cost of N fertilizer per pound and estimating the value of the crop per bushel at harvest time. Examples of estimating the economic rate of N fertilizer required for feed barley using the optimum and average charts from Table 2, are provided in Tables 14 and 15. In each example, soil test N (0-24 inches) is 50 lb/ac and two fertilizer price scenarios are used. In Table 14, the first scenario used a lower nitrogen fertilizer cost ($0.22/lb) and a higher value for barley ($2.00/bu). An economic N fertilizer rate of 120 lb/ac is predicted where a two dollar return is expected from the last dollar spent on fertilizer. The 2:1 ratio is frequently used, however, each producer can select his own cost benefit ratio to suit his personal situation. The second scenario used a higher nitrogen fertilizer cost ($0.30/lb) and a lower value for barley ($1.40/bu). An economic N fertilizer rate of 50 lb/ac is predicted where a two dollar return is expected from the last dollar spent on fertilizer.

In Table 15 with average irrigation conditions, the same two price scenarios were used. With a lower nitrogen fertilizer cost ($0.22/lb) and a higher value for barley ($2.00/bu) an economic N fertilizer rate of 50 lb/ac is predicted. The second scenario used a higher N fertilizer cost ($0.30/lb) and a lower value for barley ($1.40/bu) and an economic N fertilizer rate of 10 lb/ac is predicted. In all cases, the same crop and soil test levels were used. The variables which affected the economic rate of N fertilizer were the price of N fertilizer, crop value and optimum versus average irrigation conditions.

It is important to note that the predicted yield increase should be used for economic analysis, rather than predicted yield. The predicted yields are theoretical estimates and will vary from year to year depending on climatic and other conditions beyond the control of the farmer.

Tables 16 and 17 provide examples of estimating the N fertilizer requirement for soft wheat at optimum and average production levels when soil test N is 100 lb/ac, using two price scenarios.

Table 14. Determination of economic nitrogen fertilizer response of feed barley using the optimum irrigation chart when soil test nitrogen is 50 lb/ac (0-24 inch depth) using two scenarios. Fertilizer added is in lb/ac and yields are in bu/ac. The boxed numbers indicate the point where marginal economic return is 2:1.

| N Fertilizer Added | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Expected Yield | 64.7 | 72.2 | 78.8 | 84.5 | 89.6 | 94.1 | 98.2 | 101.8 | 105.1 | 108.1 | 110.9 | 113.4 | 115.8 | 117.9 |
| Added Yield Increase / 10 lb/ac N | | 7.5 | 6.6 | 5.7 | 5.1 | 4.5 | 4.1 | 3.7 | 3.3 | 3.0 | 2.8 | 2.5 | 2.3 | 2.2 |
| Scenario 1: Fertilizer Cost $0.22/lb | | 2.20 | 2.20 | 2.20 | 2.20 | 2.20 | 2.20 | 2.20 | 2.20 | 2.20 | 2.20 | 2.20 | 2.20 | $\boxed{2.20}$ |
| Barley @ $2.00/bu | | 15.00 | 13.00 | 11.40 | 10.20 | 9.00 | 8.20 | 7.40 | 6.60 | 6.00 | 5.60 | 5.00 | 4.60 | $\boxed{4.40}$ |
| Scenario 2: Fertilizer Cost $0.30/lb | | 3.00 | 3.00 | 3.00 | 3.00 | $\boxed{3.00}$ | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 |
| Barley @ $1.40/bu | | 10.50 | 9.10 | 7.98 | 7.14 | $\boxed{6.30}$ | 5.74 | 5.18 | 4.62 | 4.20 | 3.92 | 3.50 | 3.22 | 3.08 |

Table 15. Determination of economic nitrogen fertilizer response of feed barley using the average irrigation chart when soil test nitrogen is 50 lb/ac (0-24 inch depth) using two scenarios. Fertilizer added is in lb/ac and yields are in bu/ac. The boxed numbers indicate the point where marginal economic return is 2:1.

| N Fertilizer Added | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Expected Yield | 51.4 | 56.1 | 59.9 | 63.2 | 66.0 | 68.4 | 70.5 | 72.4 | 74.0 | 75.5 | 76.8 | 78.1 | 79.1 | 80.1 |
| Added Yield Increase / 10 lb/ac N | | 4.6 | 3.9 | 3.3 | 2.8 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.3 | 1.2 | 1.1 | 1.0 |
| Scenario 1: Fertilizer Cost $0.22/lb | | 2.20 | 2.20 | 2.20 | 2.20 | $\boxed{2.20}$ | 2.20 | 2.20 | 2.20 | 2.20 | 2.20 | 2.20 | 2.20 | 2.20 |
| Barley @ $2.00/bu | | 9.20 | 7.80 | 6.60 | 5.60 | $\boxed{4.80}$ | 4.20 | 3.80 | 3.40 | 3.00 | 2.60 | 2.40 | 2.20 | 2.00 |
| Scenario 2: Fertilizer Cost $0.30/lb | | $\boxed{3.00}$ | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 |
| Barley @ $1.40/bu | | $\boxed{6.44}$ | 5.46 | 4.62 | 3.92 | 3.36 | 2.94 | 2.66 | 2.38 | 2.10 | 1.82 | 1.68 | 1.54 | 1.40 |

Table 16. Determination of economic nitrogen fertilizer response of soft white spring wheat using the optimum irrigation chart when soil test nitrogen is 100 lb/ac (0-24 inch depth) using two scenarios. Fertilizer added is in lb/ac and yields are in bu/ac. The boxed number indicate the point where marginal economic return is 2:1.

| N Fertilizer Added | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Expected Yield | 81.4 | 84.9 | 88.2 | 91.1 | 93.8 | 96.2 | 98.4 | 100.5 | 102.4 | 104.2 | 105.8 | 107.4 | 108.8 | 110.2 |
| Added Yield Increase / 10 lb/ac N | | 3.6 | 3.2 | 2.9 | 2.7 | 2.4 | 2.2 | 2.1 | 1.9 | 1.8 | 1.7 | 1.5 | 1.4 | 1.3 |
| Scenario 1: | | | | | | | | | | | | | | |
| Fertilizer Cost $0.22/lb | | 2.20 | 2.20 | 2.20 | 2.20 | 2.20 | 2.20 | 2.20 | 2.20 | 2.20 | 2.20 | 2.20 | 2.20 | 2.20 |
| Wheat @ $4.50/bu | | 16.20 | 14.40 | 13.05 | 12.15 | 10.80 | 9.9 | 9.45 | 8.55 | 8.10 | 7.65 | 6.75 | 6.30 | 5.86 |
| Scenario 2: | | | | | | | | | | | | | | |
| Fertilizer Cost $0.30/lb | | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 |
| Wheat @ $3.00/bu | | 10.80 | 9.60 | 8.70 | 8.10 | 7.20 | 6.60 | 6.30 | 5.70 | 5.40 | 5.10 | 4.50 | 4.20 | 3.90 |

Table 17. Determination of economic nitrogen fertilizer response of soft white spring wheat using the average irrigation chart when soil test nitrogen is 100 lb/ac (0-24 inch depth) using two scenarios. Fertilizer added is in lb/ac and yields are in bu/ac. The boxed numbers indicate the point where marginal economic return is 2:1.

| N Fertilizer Added | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Expected Yield | 63.1 | 65.2 | 67.1 | 68.7 | 70.2 | 71.6 | 72.8 | 74.0 | 75.0 | 75.0 | 75.0 |
| Added Yield Increase / 10 lb/ac N | | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 | 0 | 0 |
| Scenario 1: | | | | | | | | | | | |
| Fertilizer Cost $0.22/lb | | 2.20 | 2.20 | 2.20 | 2.20 | 2.20 | 2.20 | 2.20 | 2.20 | 2.20 | 2.20 |
| Wheat @ $4.50/bu | | 9.45 | 8.55 | 7.65 | 6.75 | 6.30 | 5.40 | 4.95 | 4.50 | 0 | 0 |
| Scenario 2: | | | | | | | | | | | |
| Fertilizer Cost $0.30/lb | | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 | 3.00 |
| Wheat @ $3.00/bu | | 6.30 | 5.70 | 5.10 | 4.50 | 4.20 | 3.60 | 3.30 | 3.00 | 0 | 0 |

## 4.2 Phosphorus

Soils in southern Alberta are fairly high in total P, frequently containing over 1350 kg/ha (1200 lb/ac) in the surface soil. However, the portion of plant available P in native soils is frequently low. Much of the unavailable P is contained in soil minerals and soil organic matter.

Over many years, research projects have shown southern Alberta soils to be responsive to P fertilizer application. Results from this project indicate significant responses to fertilizer P application occurred at less than 50% of the test sites. Table 18 summarizes the P response for all crops over the past six years.

The six years of data indicate response to deep banded P occurred on fewer than 25% of the sites. Three years of data on seed placed P suggests that the frequency of P fertilizer response is less than 50% of the time. At more than 50% of the sites, the P soil test predicted a P response, which did not occur. This suggested a problem with the P soil test to identify P requirements for southern Alberta soils.

Table 18. Number and percent of sites, for all crops, which responded to fertilizer P from 1982 to 1987.

| | Deep Banded P | | Seed Placed P | |
|---|---|---|---|---|
| Year | Response | No Response | Response | No Response |
| 1982 | 1 (25%) | 3 (75%) | - | - |
| 1983 | 2 (25%) | 6 (75%) | - | - |
| 1984 | 2 (15%) | 11 (85%) | - | - |
| 1985 | 4 (28%) | 10 (71%) | 6 (43%) | 8 (57%) |
| 1986 | 3 (19%) | 13 (81%) | 5 (45%) | 6 (55%) |
| 1987 | 4 (27%) | 11 (73%) | 6 (40%) | 9 (60%) |
| Total | 16 (23%) | 54 (77%) | 17(43%) | 23(57%) |

R.H. McKenzie and J.B. Bole (unpublished data) working with $^{32}P$ found that banding N (120 kg/ha) and $P_2O_5$ (60 kg/ha) together, resulted in P uptake efficiency of 12 to 15%. However, when N and P were banded separately, P uptake efficiency was 30 to 35%. A possible explanation of this difference is that in a dual band, N fertilizer may radiate out from the band while the P does not. At high concentrations of N fertilizer, plant roots may be unable to penetrate the band to take up the P fertilizer. This may explain why deep banded N and seed placed P were more responsive than dual deep banded N and P.

Experiments were also conducted using urea-phosphoric acid (acid fertilizer) in field trials, in micro plots with $^{32}P$, and in simulated bands in the laboratory with $^{32}P$. The results showed that P fertilizer in an acid band was not more available to plants and the efficiency of uptake was no better than banded mono-ammonium phosphate (MAP). In some cases, availability and uptake of P from acid fertilizer was less than from MAP. A possible reason for this, is $H_2SO_4$ in the acid fertilizer solubilizes Ca resulting in a more rapid tie-up of fertilizer P in an acid form than in MAP form. This concurs with work by Bole (1986).

However, the fact remains that the P soil test used in these field experiments did not accurately predict P fertilizer response. There are several explanations for this. The original soil test used by the Agricultural Soil and Animal Nutrition Laboratory was developed and calibrated for dryland crop response when phosphorus fertilizer use was limited and short term. Since that time, considerable residual fertilizer P has accumulated in soils which has not been correlated with soil tests and crop response on irrigated land. Work by McKenzie et al. (1989) have demonstrated that the extraction solutions presently available appear to work satisfactorily provided that P fertilizer field research and crop response is correlated with routine soil P test levels. The results must be correlated with various P soil test methods to develop a data base such that a number of physical and chemical variables (such as crop rotation history, P fertilizer history, soil zone, climatic zone, pH, % clay, % organic matter, $CaCO_3$ content) can be appropriately matched. Only after considerable correlation work has been completed in the greenhouse, coupled with field verification, can the best routine soil P test methods be identified that would be crop, management, soil area, and climate specific to permit accurate soil test-based fertilizer P recommendations to farmers.

A major problem with acid extractants such as the Miller-Axley and the Bray methods, used by a number of laboratories in Alberta, is that the extraction solutions are neutralized by high pH, high lime soils, thus reducing their capacity to extract labile inorganic P.

The P soil test only attempts to extract the inorganic P. Considerable amounts of labile organic P exist but are not characterized by routine soil tests. The enzyme phosphatase produced by plant roots and soil microorganisms can rapidly break down labile organic P. Other factors such as rhizosphere microorganisms and vescular arbuscular (V.A.) mycorhiza may be enhancing P uptake more than previously thought.

With the high degree of variability in P response, the best recommendation is that when a producer has applied $P_2O_5$ at rates of 20 kg/ha or more annually, for the past 10 to 20 years, a maintenance application of seed placed P to irrigated crops is likely adequate for optimum crop production. If a producer has not been using P fertilizer to this extent then the recommendation in Table 19 should be used, until improved calibration curves for routine P soil tests are developed and tested.

Table 19. Existing phosphorus fertilizer recommendations at various soil test levels used by the Alberta Agricultural Soil and Animal Nutrition Laboratory using the Miller-Axley method to determine soil P.

| Soil Test Level P (lb/ac) (0 - 6 inch depth) | $P_2O_5$ Recommendation (lb/ac) | |
|---|---|---|
| | Grains & Canola | Flax |
| >60 | 10 | 10 |
| 50 - 60 | 15 | 10 |
| 40 - 50 | 20 | 15 |
| 30 - 40 | 30 | 20 |
| 20 - 30 | 40 | 25 |
| 10 - 20 | 50 | 30 |
| 0 - 10 | 60 | 35 |

## 4.3 Potassium

Generally, soil test K levels at plot sites ranged from 400 to over 1000 lb/ac, although four sites were as low as 350 lb/ac and one was at 250 lb/ac in the top six inches of soil. Table 20 provides the range of K soil test levels at plot sites. No response was noted to the KC1 fertilizer at any location, with any crop due to high levels of K in soils. Existing recommendations (Table 21) suggest K be applied when soil test levels are less than 250 lb/ac for grains and less than 300 lb/ac for canola. Very few fields test less than 300 lb/ac, primarily because of the abundance of K-bearing clay minerals.

No change in reduced lodging or reduced disease pressure were observed or measured in yield response, when KC1 fertilizer was added.

Table 20. Range of Soil Test K Levels at Plot Sites (1983-1986).

| K(lb/ac) (0-6 inches) | No. of Sites |
|---|---|
| <400 | 5 |
| 400 to 800 | 35 |
| >800 | 14 |

Table 21. Potassium fertilizer recommendations for irrigated grains and oilseed crops used by the Alberta Agricultural Soil and Animal Nutrition Laboratory using using a 0.1N NHoAc solution to extract K.

| Soil Test Level K (lb/ac) (0 - 6 inch depth) | $K_20$ Fertilizer Recommendation Grains | Canola | Flax |
|---|---|---|---|
| >300 | 0 | 0 | 0 |
| 250 - 300 | 0 | 15 | 0 |
| 200 - 250 | 15 | 20 | 15 |
| 150 - 200 | 20 | 30 | 20 |
| 100 - 150 | 40 | 40 | 25 |
| 50 - 100 | 60 | 80 | 40 |
| <50 | 80 | 80 | 40 |

## 4.4 Sulfur

Soil test levels for S ranged from less than 5 lb/ac to over 40 lb/ac of $SO_4$-S in the surface soil. Samples testing less than 5 lb/ac for grains and 10 lb/ac for canola have previously been considered deficient in sulfur.

No response was noted to S fertilizer, even at low S sites at any location, with any crop. There are several possible reasons for this:

1. Soils with low levels of $SO_4$-S in 0-6 in the surface soil often are underlain by subsoils containing adequate levels of sulfate. This is similar to dryland results by Bole and Pittman (1984).
2. Irrigation water contains sulfates, resulting in approximately 30 lb/ac of $SO_4$-S being applied with every 12 inches of water. This alone provides ample S in an available form to growing crops.
3. Rainfall provides about 5 lb/ac of S annually in southern Alberta.

## 4.5 Micronutrients

In a 1982 survey of 85 irrigated fields across southern Alberta, micronutrient soil tests showed the following numbers of fields expected to be deficient: B - 69, Zn - 28, Cu - 2, Mn and Fe - 1. Soil tests were based on USA methods and deficiency standards (Table 22).

Table 22. Range levels of soil micronutrients presently used by the Alberta Agricultural Soil and Animal Nutrition Laboratory.

| Element | Low | Medium | High |
|---|---|---|---|
| Zinc (DTPA Extractable - ppm) | 0.0 - 0.5 | 0.5 - 1.0 | 1.0+ |
| Manganese (DTPA Extractable - ppm) | 0.0 - 1.0 | --- | 1.0+ |
| Iron (DTPA Extractable - ppm) | 0.0 - 2.0 | 2.0 - 4.5 | 4.5+ |
| Copper (DTPA Extractable - ppm) | 0.0 - 0.2 | 0.3 - 0.6 | 0.6+ |
| Boron (Hot Water Soluble - ppm) | 0.0 - 0.35 | 0.35 - 1.5 | 1.5+ |

Fertilizer trials conducted from 1983 to 1987 have not shown responses to any micronutrients by small grains, canola or flax (it should be noted that responses to zinc have been obtained with dry beans on several sites and with silage corn at one site.) Although soil analysis frequently predicted the need for B and Zn, yield responses did not occur from micronutrient fertilization. Tables 23, 24, and 25 show range levels of soil test B, Zn and Cu. Tissue tests of plants did not indicate a need for micronutrients.

Table 23. Range of soil test B levels at plot sites (1983 to 1986).

| B(ppm) (0-15cm) | No. of Sites |
|---|---|
| <0.9 | 17 |
| 0.9 to 2.0 | 11 |
| >2.0 | 2 |

Table 24. Range of soil test Zn levels at plot sites (1983 to 1986).

| Z(ppm) (0-15cm) | No. of Sites |
|---|---|
| <0.6 | 9 |
| 0.6 to 1.0 | 11 |
| 1.1 to 1.6 | 15 |
| >1.6 | 4 |

Table 25. Range of Soil Test Cu Levels at Plot Sites (1983 to 1986).

| Cu(ppm) (0-15cm) | No. of Sites |
|---|---|
| <1.0 | 4 |
| 1.0 to 2.0 | 21 |
| >2.0 | 15 |

The hot water soluble test for boron, frequently predicts B deficiencies using a critical level of 0.8 ppm, but responses were not obtained with B fertilizer. The lowest levels of soil test B obtained were 0.4 ppm. The critical level for B for southern Alberta soils might be more accurate at 0.3 ppm. However, further research is required to verify this. The DTPA soil test for the metal micronutrients appears to have limitations particularly for Zn. Therefore, these methods should not be used for predicting fertilizer needs of B, Cu or Zn for irrigated crops grown on high pH soils.

Micronutrient fertilizers may be required on severely eroded land or on lands that have been machine levelled exposing subsoil. In such cases maintenance applications of micronutrients to prevent future deficiencies may be necessary. Normally, however, micronutrient fertilizers are not required by irrigated grains or oilseed crops in southern Alberta.

## 5. CONCLUSIONS

1. N fertilizer increased crop production and therefore yield increase charts have been developed from field trials for use by soil test laboratories, fertilizer dealers and farmers.
2. Crop response to P fertilizer was variable and not well predicted by soil tests. Further work to calibrate the P soil tests to predict P fertilizer response by crops is ongoing.
3. K and S did not appear to be limiting factors in yield of crops studied. This may have resulted from the relatively high levels of these elements in southern Alberta soils.
4. Micronutrients are rarely required on irrigated grains and oilseed crops. Improvements in micronutrient soil testing, calibration and interpretation are required.

## 6. FUTURE RESEARCH NEEDS

1. There is a need to establish benchmark sites to evaluate fertilizer response by new crop varieties and to develop agronomic cropping systems under irrigated conditions in southern Alberta.
2. Further work is required on the calibration of the P soil test to predict crop responses to P fertilizer.
3. There is a need to study the effect of how the increasing depth of soil N affects the fertilizer N response curves for the various irrigated crops.
4. Further study of micronutrients will eventually be required to calibrate exsisting soil tests with crop response, as soils gradually become depleted of these nutrients.

## 7. ACKNOWLEDGEMENTS

The authors thank the Alberta Agricultural Soil and Animal Nutrition Laboratory for soil, plant tissue, and grain analysis.

Financial support from the Soils Branch and an FFF grant from the Research Division of Alberta Agriculture is gratefully acknowledged.

The assistance with the canola plots by Mr. Keith Topinka of the FFF Canola project was appreciated.

We gratefully acknowledge the technical efforts of Charles Anstey, Chris Dyck, Mary Anne Maclean, Gary Tokariuk, and Denise Twa, during the years of this project.

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McKenzie, R.H., L. Kryzanowski and J.M. Carefoot. 1987. Fertilizer requirements of irrigated grains and oilseed crops in southern Alberta. Proc. of 24th Annual Alberta Soil Science Workshop, Feb. 17 and 18, 1987. pp 97-115.

## 9. FUND DISBURSEMENTS

| Fiscal Year | Amount Awarded | Amount Spent |
|---|---|---|
| 1984/1985 | 44,200 | 36,632.81 |
| 1985/1986 | 53,601 | 47,146.62 |
| 1986/1987 | 42,200 | 41,171.60 |
| 1987/1988 | 55,000 | 47,485.15 |
|  | $ 195,001 | $172,436.18 |

Total funds allocated to this project amounted to $195,001.00 with an expenditure of $172,436.18.

The major expense was a technologist position for the four years. Other expenses included purchase of seed, fertilizer and chemicals as well as rental of land and a 3/4 ton truck. Two fixed assets were purchased. In the first year, a $6,000 neutron probe was obtained for measurement of soil moisture and scheduling irrigation in plots. The second year, $7,000 worth of hand move irrigation equipment was purchased to ensure adequate irrigation of plot sites.

## 10. LIST OF PUBLICATIONS

McKenzie, R.H., L. Kryzanowski and J.M. Carefoot. 1987. Fertilizer requirements of irrigated grains and oilseed crops in southern Alberta. In: 24th Annual Alta. Soils Sci. Workshop Proceedings, U of A, Edmonton. 19 pages.

A number of extension bulletins were being prepared for specific crops at the time this final report was completed.

A paper will be presented at the "Irrigation Research and Development in the 1990's" conference to be held in Lethbridge, July 17-20, 1990.

## 11. APPENDIX

The tables in the report are for predicted yield for each crop. The appendix includes the tables for:

i) predicted yield increase and

ii) added yield increase,

for each crop included in the study. It is important to remember that the predicted yield increase should be used for economic analysis, rather than predicted yield. The predicted yields are theoretical estimates and will vary from year to year depending on climatic and other conditions beyond the control of the farmer.

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PREDICTED YIELD INCREASE (BU/AC) TABLE

CROP=FEED BARLEY | IRRIGATION=AVERAGE

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 12.3 | 21.4 | 28.5 | 34.2 | 38.8 | 42.7 | 46.0 | 48.7 | 51.2 | 53.3 | 55.1 | 56.8 | 58.3 | 59.6 | 60.8 |
| 20 | 0.0 | 9.2 | 16.3 | 21.9 | 26.6 | 30.4 | 33.7 | 36.5 | 38.9 | 41.0 | 42.9 | 44.5 | 46.0 | 47.4 | 48.6 | 49.7 |
| 30 | 0.0 | 7.1 | 12.8 | 17.4 | 21.3 | 24.5 | 27.3 | 29.8 | 31.9 | 33.7 | 35.4 | 36.9 | 38.2 | 39.4 | 40.5 | 41.5 |
| 40 | 0.0 | 5.7 | 10.3 | 14.2 | 17.4 | 20.2 | 22.6 | 24.8 | 26.6 | 28.3 | 29.8 | 31.1 | 32.3 | 33.4 | 34.4 | 0.0 |
| 50 | 0.0 | 4.6 | 8.5 | 11.8 | 14.5 | 17.0 | 19.1 | 20.9 | 22.6 | 24.1 | 25.4 | 26.6 | 27.7 | 28.7 | 0.0 | 0.0 |
| 60 | 0.0 | 3.9 | 7.1 | 9.9 | 12.3 | 14.4 | 16.3 | 18.0 | 19.5 | 20.8 | 22.0 | 23.1 | 24.1 | 0.0 | 0.0 | 0.0 |
| 70 | 0.0 | 3.3 | 6.1 | 8.5 | 10.6 | 12.5 | 14.1 | 15.6 | 16.9 | 18.1 | 19.2 | 20.2 | 0.0 | 0.0 | 0.0 | 0.0 |
| 80 | 0.0 | 2.8 | 5.2 | 7.3 | 9.2 | 10.8 | 12.3 | 13.7 | 14.9 | 16.0 | 17.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 90 | 0.0 | 2.4 | 4.5 | 6.4 | 8.1 | 9.5 | 10.9 | 12.1 | 13.2 | 14.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100 | 0.0 | 2.1 | 4.0 | 5.6 | 7.1 | 8.5 | 9.7 | 10.8 | 11.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110 | 0.0 | 1.9 | 3.5 | 5.0 | 6.3 | 7.5 | 8.6 | 9.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120 | 0.0 | 1.7 | 3.1 | 4.5 | 5.7 | 6.8 | 7.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130 | 0.0 | 1.5 | 2.8 | 4.0 | 5.1 | 6.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140 | 0.0 | 1.3 | 2.5 | 3.6 | 4.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150 | 0.0 | 1.2 | 2.3 | 3.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

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PREDICTED YIELD INCREASE (BU/AC) TABLE

CROP=FEED BARLEY | IRRIGATION=OPTIUM

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 14.9 | 27.2 | 37.5 | 46.2 | 53.7 | 60.3 | 66.0 | 71.1 | 75.6 | 79.7 | 83.3 | 86.6 | 89.6 | 92.4 | 94.9 |
| 20 | 0.0 | 12.3 | 22.6 | 31.3 | 38.8 | 45.4 | 51.1 | 56.2 | 60.7 | 64.7 | 68.4 | 71.7 | 74.7 | 77.5 | 80.0 | 82.3 |
| 30 | 0.0 | 10.3 | 19.0 | 26.5 | 33.1 | 38.8 | 43.9 | 48.4 | 52.5 | 56.1 | 59.4 | 62.4 | 65.2 | 67.7 | 70.1 | 72.2 |
| 40 | 0.0 | 8.7 | 16.3 | 22.8 | 28.5 | 33.6 | 38.1 | 42.2 | 45.8 | 49.1 | 52.2 | 54.9 | 57.4 | 59.8 | 61.9 | 63.9 |
| 50 | 0.0 | 7.5 | 14.1 | 19.8 | 24.9 | 29.4 | 33.4 | 37.1 | 40.4 | 43.4 | 46.2 | 48.7 | 51.0 | 53.2 | 55.2 | 57.0 |
| 60 | 0.0 | 6.5 | 12.3 | 17.3 | 21.9 | 25.9 | 29.6 | 32.9 | 35.9 | 38.7 | 41.2 | 43.5 | 45.7 | 47.7 | 49.5 | 51.2 |
| 70 | 0.0 | 5.7 | 10.8 | 15.3 | 19.4 | 23.0 | 26.3 | 29.4 | 32.1 | 34.6 | 37.0 | 39.1 | 41.1 | 43.0 | 44.7 | 46.3 |
| 80 | 0.0 | 5.1 | 9.6 | 13.6 | 17.3 | 20.6 | 23.6 | 26.4 | 28.9 | 31.2 | 33.4 | 35.4 | 37.2 | 39.0 | 40.6 | 42.1 |
| 90 | 0.0 | 4.5 | 8.6 | 12.2 | 15.5 | 18.5 | 21.3 | 23.8 | 26.2 | 28.3 | 30.3 | 32.2 | 33.9 | 35.5 | 37.0 | 38.4 |
| 100 | 0.0 | 4.1 | 7.7 | 11.0 | 14.0 | 16.8 | 19.3 | 21.6 | 23.8 | 25.8 | 27.6 | 29.4 | 31.0 | 32.5 | 33.9 | 35.2 |
| 110 | 0.0 | 3.7 | 7.0 | 10.0 | 12.7 | 15.3 | 17.6 | 19.7 | 21.7 | 23.6 | 25.3 | 26.9 | 28.4 | 29.9 | 31.2 | 32.4 |
| 120 | 0.0 | 3.3 | 6.3 | 9.1 | 11.6 | 13.9 | 16.1 | 18.1 | 19.9 | 21.7 | 23.3 | 24.8 | 26.2 | 27.5 | 28.8 | 30.0 |
| 130 | 0.0 | 3.0 | 5.8 | 8.3 | 10.6 | 12.8 | 14.8 | 16.6 | 18.4 | 20.0 | 21.5 | 22.9 | 24.2 | 25.5 | 26.7 | 27.8 |
| 140 | 0.0 | 2.8 | 5.3 | 7.6 | 9.8 | 11.8 | 13.6 | 15.3 | 17.0 | 18.5 | 19.9 | 21.2 | 22.5 | 23.6 | 24.8 | 25.8 |
| 150 | 0.0 | 2.5 | 4.9 | 7.0 | 9.0 | 10.9 | 12.6 | 14.2 | 15.7 | 17.1 | 18.5 | 19.7 | 20.9 | 22.0 | 23.1 | 24.1 |

ADDED YIELD INCREASE (BU/AC) TABLE

CROP=FEED BARLEY | IRRIGATION=AVERAGE

| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 12.3 | 9.2 | 7.1 | 5.7 | 4.6 | 3.9 | 3.3 | 2.8 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.3 | 1.2 |
| 20 | 0.0 | 9.2 | 7.1 | 5.7 | 4.6 | 3.9 | 3.3 | 2.8 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.3 | 1.2 | 1.1 |
| 30 | 0.0 | 7.1 | 5.7 | 4.6 | 3.9 | 3.3 | 2.8 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.3 | 1.2 | 1.1 | 1.0 |
| 40 | 0.0 | 5.7 | 4.6 | 3.9 | 3.3 | 2.8 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 |
| 50 | 0.0 | 4.6 | 3.9 | 3.3 | 2.8 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 |
| 60 | 0.0 | 3.9 | 3.3 | 2.8 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 |
| 70 | 0.0 | 3.3 | 2.8 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 80 | 0.0 | 2.8 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 90 | 0.0 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100 | 0.0 | 2.1 | 1.9 | 1.7 | 1.5 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110 | 0.0 | 1.9 | 1.7 | 1.5 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120 | 0.0 | 1.7 | 1.5 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130 | 0.0 | 1.5 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140 | 0.0 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150 | 0.0 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

ADDED YIELD INCREASE (BU/AC) TABLE

CROP=FEED BARLEY | IRRIGATION=OPTIUM

| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 14.9 | 12.3 | 10.3 | 8.7 | 7.5 | 6.5 | 5.7 | 5.1 | 4.5 | 4.1 | 3.7 | 3.3 | 3.0 | 2.8 | 2.5 |
| 20 | 0.0 | 12.3 | 10.3 | 8.7 | 7.5 | 6.5 | 5.7 | 5.1 | 4.5 | 4.1 | 3.7 | 3.3 | 3.0 | 2.8 | 2.5 | 2.3 |
| 30 | 0.0 | 10.3 | 8.7 | 7.5 | 6.5 | 5.7 | 5.1 | 4.5 | 4.1 | 3.7 | 3.3 | 3.0 | 2.8 | 2.5 | 2.3 | 2.2 |
| 40 | 0.0 | 8.7 | 7.5 | 6.5 | 5.7 | 5.1 | 4.5 | 4.1 | 3.7 | 3.3 | 3.0 | 2.8 | 2.5 | 2.3 | 2.2 | 2.0 |
| 50 | 0.0 | 7.5 | 6.5 | 5.7 | 5.1 | 4.5 | 4.1 | 3.7 | 3.3 | 3.0 | 2.8 | 2.5 | 2.3 | 2.2 | 2.0 | 1.9 |
| 60 | 0.0 | 6.5 | 5.7 | 5.1 | 4.5 | 4.1 | 3.7 | 3.3 | 3.0 | 2.8 | 2.5 | 2.3 | 2.2 | 2.0 | 1.9 | 1.7 |
| 70 | 0.0 | 5.7 | 5.1 | 4.5 | 4.1 | 3.7 | 3.3 | 3.0 | 2.8 | 2.5 | 2.3 | 2.2 | 2.0 | 1.9 | 1.7 | 1.6 |
| 80 | 0.0 | 5.1 | 4.5 | 4.1 | 3.7 | 3.3 | 3.0 | 2.8 | 2.5 | 2.3 | 2.2 | 2.0 | 1.9 | 1.7 | 1.6 | 1.5 |
| 90 | 0.0 | 4.5 | 4.1 | 3.7 | 3.3 | 3.0 | 2.8 | 2.5 | 2.3 | 2.2 | 2.0 | 1.9 | 1.7 | 1.6 | 1.5 | 1.4 |
| 100 | 0.0 | 4.1 | 3.7 | 3.3 | 3.0 | 2.8 | 2.5 | 2.3 | 2.2 | 2.0 | 1.9 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 |
| 110 | 0.0 | 3.7 | 3.3 | 3.0 | 2.8 | 2.5 | 2.3 | 2.2 | 2.0 | 1.9 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 | 1.3 |
| 120 | 0.0 | 3.3 | 3.0 | 2.8 | 2.5 | 2.3 | 2.2 | 2.0 | 1.9 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 | 1.3 | 1.2 |
| 130 | 0.0 | 3.0 | 2.8 | 2.5 | 2.3 | 2.2 | 2.0 | 1.9 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 | 1.3 | 1.2 | 1.1 |
| 140 | 0.0 | 2.8 | 2.5 | 2.3 | 2.2 | 2.0 | 1.9 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 | 1.3 | 1.2 | 1.1 | 1.1 |
| 150 | 0.0 | 2.5 | 2.3 | 2.2 | 2.0 | 1.9 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 | 1.3 | 1.2 | 1.1 | 1.1 | 1.0 |

### PREDICTED YIELD INCREASE (BU/AC) TABLE

CROP=MALT BARLEY | IRRIGATION=AVERAGE

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 11.7 | 20.4 | 27.2 | 32.5 | 36.9 | 40.5 | 43.5 | 46.1 | 48.4 | 50.4 | 52.1 | 53.7 | 55.0 | 56.3 | 57.4 |
| 20 | 0.0 | 8.7 | 15.4 | 20.8 | 25.1 | 28.8 | 31.8 | 34.4 | 36.7 | 38.7 | 40.4 | 41.9 | 43.3 | 44.5 | 45.7 | 46.7 |
| 30 | 0.0 | 6.7 | 12.1 | 16.4 | 20.1 | 23.1 | 25.7 | 28.0 | 29.9 | 31.7 | 33.2 | 34.6 | 35.8 | 36.9 | 38.0 | 0.0 |
| 40 | 0.0 | 5.4 | 9.7 | 13.3 | 16.4 | 19.0 | 21.2 | 23.2 | 24.9 | 26.5 | 27.9 | 29.1 | 30.2 | 31.2 | 0.0 | 0.0 |
| 50 | 0.0 | 4.4 | 8.0 | 11.0 | 13.6 | 15.9 | 17.9 | 19.6 | 21.1 | 22.5 | 23.8 | 24.9 | 25.9 | 0.0 | 0.0 | 0.0 |
| 60 | 0.0 | 3.6 | 6.7 | 9.3 | 11.5 | 13.5 | 15.2 | 16.8 | 18.2 | 19.4 | 20.5 | 21.5 | 0.0 | 0.0 | 0.0 | 0.0 |
| 70 | 0.0 | 3.1 | 5.7 | 7.9 | 9.9 | 11.6 | 13.2 | 14.5 | 15.8 | 16.9 | 17.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 80 | 0.0 | 2.6 | 4.9 | 6.8 | 8.6 | 10.1 | 11.5 | 12.7 | 13.8 | 14.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 90 | 0.0 | 2.3 | 4.2 | 6.0 | 7.5 | 8.9 | 10.1 | 11.2 | 12.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100 | 0.0 | 2.0 | 3.7 | 5.2 | 6.6 | 7.9 | 9.0 | 10.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110 | 0.0 | 1.7 | 3.3 | 4.7 | 5.9 | 7.0 | 8.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120 | 0.0 | 1.5 | 2.9 | 4.2 | 5.3 | 6.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130 | 0.0 | 1.4 | 2.6 | 3.7 | 4.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140 | 0.0 | 1.2 | 2.4 | 3.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150 | 0.0 | 1.1 | 2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

### PREDICTED YIELD INCREASE (BU/AC) TABLE

CROP=MALT BARLEY | IRRIGATION=OPTIUM

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 14.3 | 26.0 | 35.7 | 44.0 | 51.0 | 57.2 | 62.5 | 67.2 | 71.4 | 75.2 | 78.6 | 81.6 | 84.4 | 87.0 | 89.3 |
| 20 | 0.0 | 11.7 | 21.4 | 29.7 | 36.7 | 42.9 | 48.2 | 52.9 | 57.1 | 60.9 | 64.3 | 67.4 | 70.1 | 72.7 | 75.0 | 77.1 |
| 30 | 0.0 | 9.7 | 18.0 | 25.1 | 31.2 | 36.5 | 41.3 | 45.5 | 49.2 | 52.6 | 55.7 | 58.4 | 61.0 | 63.3 | 65.4 | 67.4 |
| 40 | 0.0 | 8.2 | 15.3 | 21.4 | 26.8 | 31.5 | 35.7 | 39.5 | 42.9 | 45.9 | 48.7 | 51.2 | 53.6 | 55.7 | 57.7 | 59.5 |
| 50 | 0.0 | 7.1 | 13.2 | 18.5 | 23.3 | 27.5 | 31.2 | 34.6 | 37.7 | 40.5 | 43.0 | 45.3 | 47.5 | 49.4 | 51.3 | 53.0 |
| 60 | 0.0 | 6.1 | 11.5 | 16.2 | 20.4 | 24.2 | 27.5 | 30.6 | 33.4 | 35.9 | 38.3 | 40.4 | 42.4 | 44.2 | 45.9 | 47.5 |
| 70 | 0.0 | 5.4 | 10.1 | 14.3 | 18.0 | 21.4 | 24.5 | 27.3 | 29.8 | 32.1 | 34.3 | 36.3 | 38.1 | 39.8 | 41.4 | 42.8 |
| 80 | 0.0 | 4.7 | 8.9 | 12.7 | 16.1 | 19.1 | 21.9 | 24.4 | 26.8 | 28.9 | 30.9 | 32.7 | 34.4 | 36.0 | 37.5 | 38.9 |
| 90 | 0.0 | 4.2 | 8.0 | 11.3 | 14.4 | 17.2 | 19.7 | 22.1 | 24.2 | 26.2 | 28.0 | 29.7 | 31.3 | 32.8 | 34.1 | 35.4 |
| 100 | 0.0 | 3.8 | 7.1 | 10.2 | 13.0 | 15.5 | 17.9 | 20.0 | 22.0 | 23.8 | 25.5 | 27.1 | 28.6 | 29.9 | 31.2 | 32.5 |
| 110 | 0.0 | 3.4 | 6.4 | 9.2 | 11.8 | 14.1 | 16.2 | 18.2 | 20.0 | 21.7 | 23.3 | 24.8 | 26.2 | 27.5 | 28.7 | 29.8 |
| 120 | 0.0 | 3.1 | 5.8 | 8.4 | 10.7 | 12.9 | 14.8 | 16.7 | 18.4 | 19.9 | 21.4 | 22.8 | 24.1 | 25.3 | 26.5 | 27.5 |
| 130 | 0.0 | 2.8 | 5.3 | 7.6 | 9.8 | 11.8 | 13.6 | 15.3 | 16.9 | 18.4 | 19.7 | 21.0 | 22.3 | 23.4 | 24.5 | 25.5 |
| 140 | 0.0 | 2.5 | 4.9 | 7.0 | 9.0 | 10.8 | 12.5 | 14.1 | 15.6 | 17.0 | 18.3 | 19.5 | 20.6 | 21.7 | 22.7 | 0.0 |
| 150 | 0.0 | 2.3 | 4.5 | 6.4 | 8.3 | 10.0 | 11.6 | 13.0 | 14.4 | 15.7 | 16.9 | 18.1 | 19.2 | 20.2 | 0.0 | 0.0 |

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ADDED YIELD INCREASE (BU/AC) TABLE

CROP=MALT BARLEY | IRRIGATION=AVERAGE

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 11.7 | 8.7 | 6.7 | 5.4 | 4.4 | 3.6 | 3.1 | 2.6 | 2.3 | 2.0 | 1.7 | 1.5 | 1.4 | 1.2 | 1.1 |
| 20 | 0.0 | 8.7 | 6.7 | 5.4 | 4.4 | 3.6 | 3.1 | 2.6 | 2.3 | 2.0 | 1.7 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 |
| 30 | 0.0 | 6.7 | 5.4 | 4.4 | 3.6 | 3.1 | 2.6 | 2.3 | 2.0 | 1.7 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 |
| 40 | 0.0 | 5.4 | 4.4 | 3.6 | 3.1 | 2.6 | 2.3 | 2.0 | 1.7 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 |
| 50 | 0.0 | 4.4 | 3.6 | 3.1 | 2.6 | 2.3 | 2.0 | 1.7 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 |
| 60 | 0.0 | 3.6 | 3.1 | 2.6 | 2.3 | 2.0 | 1.7 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 70 | 0.0 | 3.1 | 2.6 | 2.3 | 2.0 | 1.7 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 80 | 0.0 | 2.6 | 2.3 | 2.0 | 1.7 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 90 | 0.0 | 2.3 | 2.0 | 1.7 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100 | 0.0 | 2.0 | 1.7 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110 | 0.0 | 1.7 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120 | 0.0 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130 | 0.0 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140 | 0.0 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150 | 0.0 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

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ADDED YIELD INCREASE (BU/AC) TABLE

CROP=MALT BARLEY | IRRIGATION=OPTIUM

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 14.3 | 11.7 | 9.7 | 8.2 | 7.1 | 6.1 | 5.4 | 4.7 | 4.2 | 3.8 | 3.4 | 3.1 | 2.8 | 2.5 | 2.3 |
| 20 | 0.0 | 11.7 | 9.7 | 8.2 | 7.1 | 6.1 | 5.4 | 4.7 | 4.2 | 3.8 | 3.4 | 3.1 | 2.8 | 2.5 | 2.3 | 2.1 |
| 30 | 0.0 | 9.7 | 8.2 | 7.1 | 6.1 | 5.4 | 4.7 | 4.2 | 3.8 | 3.4 | 3.1 | 2.8 | 2.5 | 2.3 | 2.1 | 2.0 |
| 40 | 0.0 | 8.2 | 7.1 | 6.1 | 5.4 | 4.7 | 4.2 | 3.8 | 3.4 | 3.1 | 2.8 | 2.5 | 2.3 | 2.1 | 2.0 | 1.8 |
| 50 | 0.0 | 7.1 | 6.1 | 5.4 | 4.7 | 4.2 | 3.8 | 3.4 | 3.1 | 2.8 | 2.5 | 2.3 | 2.1 | 2.0 | 1.8 | 1.7 |
| 60 | 0.0 | 6.1 | 5.4 | 4.7 | 4.2 | 3.8 | 3.4 | 3.1 | 2.8 | 2.5 | 2.3 | 2.1 | 2.0 | 1.8 | 1.7 | 1.6 |
| 70 | 0.0 | 5.4 | 4.7 | 4.2 | 3.8 | 3.4 | 3.1 | 2.8 | 2.5 | 2.3 | 2.1 | 2.0 | 1.8 | 1.7 | 1.6 | 1.5 |
| 80 | 0.0 | 4.7 | 4.2 | 3.8 | 3.4 | 3.1 | 2.8 | 2.5 | 2.3 | 2.1 | 2.0 | 1.8 | 1.7 | 1.6 | 1.5 | 1.4 |
| 90 | 0.0 | 4.2 | 3.8 | 3.4 | 3.1 | 2.8 | 2.5 | 2.3 | 2.1 | 2.0 | 1.8 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 |
| 100 | 0.0 | 3.8 | 3.4 | 3.1 | 2.8 | 2.5 | 2.3 | 2.1 | 2.0 | 1.8 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 | 1.2 |
| 110 | 0.0 | 3.4 | 3.1 | 2.8 | 2.5 | 2.3 | 2.1 | 2.0 | 1.8 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 | 1.2 | 1.1 |
| 120 | 0.0 | 3.1 | 2.8 | 2.5 | 2.3 | 2.1 | 2.0 | 1.8 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 | 1.2 | 1.1 | 1.1 |
| 130 | 0.0 | 2.8 | 2.5 | 2.3 | 2.1 | 2.0 | 1.8 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 | 1.2 | 1.1 | 1.1 | 1.0 |
| 140 | 0.0 | 2.5 | 2.3 | 2.1 | 2.0 | 1.8 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 | 1.2 | 1.1 | 1.1 | 1.0 | 0.0 |
| 150 | 0.0 | 2.3 | 2.1 | 2.0 | 1.8 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 | 1.2 | 1.1 | 1.1 | 1.0 | 0.0 | 0.0 |

PREDICTED YIELD INCREASE (BU/AC) TABLE

CROP=DURUM WHEAT | IRRIGATION=AVERAGE

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 10.1 | 17.7 | 23.6 | 28.4 | 32.3 | 35.5 | 38.3 | 40.6 | 42.7 | 44.5 | 46.1 | 47.5 | 48.7 | 49.9 | 50.9 |
| 20 | 0.0 | 7.6 | 13.5 | 18.3 | 22.2 | 25.4 | 28.2 | 30.5 | 32.6 | 34.4 | 36.0 | 37.4 | 38.6 | 39.8 | 40.8 | 0.0 |
| 30 | 0.0 | 5.9 | 10.7 | 14.6 | 17.8 | 20.6 | 22.9 | 25.0 | 26.8 | 28.4 | 29.8 | 31.0 | 32.2 | 33.2 | 0.0 | 0.0 |
| 40 | 0.0 | 4.8 | 8.6 | 11.9 | 14.7 | 17.0 | 19.1 | 20.9 | 22.4 | 23.9 | 25.1 | 26.3 | 27.3 | 0.0 | 0.0 | 0.0 |
| 50 | 0.0 | 3.9 | 7.1 | 9.9 | 12.3 | 14.3 | 16.1 | 17.7 | 19.1 | 20.4 | 21.5 | 22.5 | 0.0 | 0.0 | 0.0 | 0.0 |
| 60 | 0.0 | 3.3 | 6.0 | 8.4 | 10.4 | 12.2 | 13.8 | 15.2 | 16.5 | 17.6 | 18.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 70 | 0.0 | 2.8 | 5.1 | 7.2 | 9.0 | 10.5 | 12.0 | 13.2 | 14.4 | 15.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 80 | 0.0 | 2.4 | 4.4 | 6.2 | 7.8 | 9.2 | 10.5 | 11.6 | 12.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 90 | 0.0 | 2.1 | 3.8 | 5.4 | 6.8 | 8.1 | 9.2 | 10.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100 | 0.0 | 1.8 | 3.4 | 4.8 | 6.1 | 7.2 | 8.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110 | 0.0 | 1.6 | 3.0 | 4.3 | 5.4 | 6.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120 | 0.0 | 1.4 | 2.7 | 3.8 | 4.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130 | 0.0 | 1.3 | 2.4 | 3.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140 | 0.0 | 1.1 | 2.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150 | 0.0 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

PREDICTED YIELD INCREASE (BU/AC) TABLE

CROP=DURUM WHEAT | IRRIGATION=OPTIUM

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 11.2 | 20.2 | 27.4 | 33.4 | 38.4 | 42.8 | 46.5 | 49.7 | 52.6 | 55.1 | 57.4 | 59.4 | 61.2 | 62.9 | 64.4 |
| 20 | 0.0 | 8.9 | 16.2 | 22.2 | 27.2 | 31.5 | 35.2 | 38.5 | 41.3 | 43.9 | 46.1 | 48.2 | 50.0 | 51.7 | 53.2 | 54.6 |
| 30 | 0.0 | 7.2 | 13.2 | 18.3 | 22.6 | 26.3 | 29.6 | 32.4 | 35.0 | 37.2 | 39.3 | 41.1 | 42.8 | 44.3 | 45.7 | 46.9 |
| 40 | 0.0 | 6.0 | 11.0 | 15.4 | 19.1 | 22.3 | 25.2 | 27.7 | 30.0 | 32.0 | 33.9 | 35.5 | 37.0 | 38.4 | 39.7 | 40.9 |
| 50 | 0.0 | 5.1 | 9.4 | 13.1 | 16.3 | 19.2 | 21.7 | 24.0 | 26.0 | 27.9 | 29.5 | 31.0 | 32.4 | 33.7 | 34.9 | 36.0 |
| 60 | 0.0 | 4.3 | 8.0 | 11.3 | 14.1 | 16.7 | 18.9 | 21.0 | 22.8 | 24.5 | 26.0 | 27.4 | 28.7 | 29.8 | 30.9 | 31.9 |
| 70 | 0.0 | 3.7 | 7.0 | 9.8 | 12.4 | 14.6 | 16.7 | 18.5 | 20.2 | 21.7 | 23.1 | 24.3 | 25.5 | 26.6 | 27.6 | 0.0 |
| 80 | 0.0 | 3.2 | 6.1 | 8.6 | 10.9 | 12.9 | 14.8 | 16.4 | 18.0 | 19.3 | 20.6 | 21.8 | 22.9 | 23.9 | 0.0 | 0.0 |
| 90 | 0.0 | 2.9 | 5.4 | 7.7 | 9.7 | 11.5 | 13.2 | 14.7 | 16.1 | 17.4 | 18.6 | 19.6 | 20.7 | 0.0 | 0.0 | 0.0 |
| 100 | 0.0 | 2.5 | 4.8 | 6.8 | 8.7 | 10.3 | 11.8 | 13.2 | 14.5 | 15.7 | 16.8 | 17.8 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110 | 0.0 | 2.3 | 4.3 | 6.1 | 7.8 | 9.3 | 10.7 | 12.0 | 13.2 | 14.2 | 15.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120 | 0.0 | 2.0 | 3.9 | 5.5 | 7.1 | 8.4 | 9.7 | 10.9 | 12.0 | 13.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130 | 0.0 | 1.8 | 3.5 | 5.0 | 6.4 | 7.7 | 8.9 | 10.0 | 11.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140 | 0.0 | 1.7 | 3.2 | 4.6 | 5.9 | 7.0 | 8.1 | 9.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150 | 0.0 | 1.5 | 2.9 | 4.2 | 5.4 | 6.5 | 7.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

ADDED YIELD INCREASE (BU/AC) TABLE

CROP=DURUM WHEAT | IRRIGATION=AVERAGE

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 10.1 | 7.6 | 5.9 | 4.8 | 3.9 | 3.3 | 2.8 | 2.4 | 2.1 | 1.8 | 1.6 | 1.4 | 1.3 | 1.1 | 1.0 |
| 20 | 0.0 | 7.6 | 5.9 | 4.8 | 3.9 | 3.3 | 2.8 | 2.4 | 2.1 | 1.8 | 1.6 | 1.4 | 1.3 | 1.1 | 1.0 | 0.0 |
| 30 | 0.0 | 5.9 | 4.8 | 3.9 | 3.3 | 2.8 | 2.4 | 2.1 | 1.8 | 1.6 | 1.4 | 1.3 | 1.1 | 1.0 | 0.0 | 0.0 |
| 40 | 0.0 | 4.8 | 3.9 | 3.3 | 2.8 | 2.4 | 2.1 | 1.8 | 1.6 | 1.4 | 1.3 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 |
| 50 | 0.0 | 3.9 | 3.3 | 2.8 | 2.4 | 2.1 | 1.8 | 1.6 | 1.4 | 1.3 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 60 | 0.0 | 3.3 | 2.8 | 2.4 | 2.1 | 1.8 | 1.6 | 1.4 | 1.3 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 70 | 0.0 | 2.8 | 2.4 | 2.1 | 1.8 | 1.6 | 1.4 | 1.3 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 80 | 0.0 | 2.4 | 2.1 | 1.8 | 1.6 | 1.4 | 1.3 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 90 | 0.0 | 2.1 | 1.8 | 1.6 | 1.4 | 1.3 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100 | 0.0 | 1.8 | 1.6 | 1.4 | 1.3 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110 | 0.0 | 1.6 | 1.4 | 1.3 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120 | 0.0 | 1.4 | 1.3 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130 | 0.0 | 1.3 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140 | 0.0 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150 | 0.0 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

ADDED YIELD INCREASE (BU/AC) TABLE

CROP=DURUM WHEAT | IRRIGATION=OPTIUM

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 11.2 | 8.9 | 7.2 | 6.0 | 5.1 | 4.3 | 3.7 | 3.2 | 2.9 | 2.5 | 2.3 | 2.0 | 1.8 | 1.7 | 1.5 |
| 20 | 0.0 | 8.9 | 7.2 | 6.0 | 5.1 | 4.3 | 3.7 | 3.2 | 2.9 | 2.5 | 2.3 | 2.0 | 1.8 | 1.7 | 1.5 | 1.4 |
| 30 | 0.0 | 7.2 | 6.0 | 5.1 | 4.3 | 3.7 | 3.2 | 2.9 | 2.5 | 2.3 | 2.0 | 1.8 | 1.7 | 1.5 | 1.4 | 1.3 |
| 40 | 0.0 | 6.0 | 5.1 | 4.3 | 3.7 | 3.2 | 2.9 | 2.5 | 2.3 | 2.0 | 1.8 | 1.7 | 1.5 | 1.4 | 1.3 | 1.2 |
| 50 | 0.0 | 5.1 | 4.3 | 3.7 | 3.2 | 2.9 | 2.5 | 2.3 | 2.0 | 1.8 | 1.7 | 1.5 | 1.4 | 1.3 | 1.2 | 1.1 |
| 60 | 0.0 | 4.3 | 3.7 | 3.2 | 2.9 | 2.5 | 2.3 | 2.0 | 1.8 | 1.7 | 1.5 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 |
| 70 | 0.0 | 3.7 | 3.2 | 2.9 | 2.5 | 2.3 | 2.0 | 1.8 | 1.7 | 1.5 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 |
| 80 | 0.0 | 3.2 | 2.9 | 2.5 | 2.3 | 2.0 | 1.8 | 1.7 | 1.5 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 |
| 90 | 0.0 | 2.9 | 2.5 | 2.3 | 2.0 | 1.8 | 1.7 | 1.5 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 |
| 100 | 0.0 | 2.5 | 2.3 | 2.0 | 1.8 | 1.7 | 1.5 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110 | 0.0 | 2.3 | 2.0 | 1.8 | 1.7 | 1.5 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120 | 0.0 | 2.0 | 1.8 | 1.7 | 1.5 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130 | 0.0 | 1.8 | 1.7 | 1.5 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140 | 0.0 | 1.7 | 1.5 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150 | 0.0 | 1.5 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

### PREDICTED YIELD INCREASE (BU/AC) TABLE

CROP=SOFT WHEAT | IRRIGATION=AVERAGE

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 11.0 | 19.4 | 26.1 | 31.5 | 36.0 | 39.7 | 42.9 | 45.7 | 48.1 | 50.3 | 52.1 | 53.8 | 55.3 | 56.7 | 57.9 |
| 20 | 0.0 | 8.4 | 15.1 | 20.5 | 25.0 | 28.7 | 32.0 | 34.7 | 37.1 | 39.3 | 41.2 | 42.8 | 44.3 | 45.7 | 46.9 | 48.1 |
| 30 | 0.0 | 6.7 | 12.1 | 16.6 | 20.3 | 23.5 | 26.3 | 28.7 | 30.8 | 32.7 | 34.4 | 35.9 | 37.3 | 38.5 | 39.6 | 40.7 |
| 40 | 0.0 | 5.4 | 9.9 | 13.7 | 16.9 | 19.6 | 22.0 | 24.2 | 26.1 | 27.7 | 29.2 | 30.6 | 31.8 | 33.0 | 34.0 | 0.0 |
| 50 | 0.0 | 4.5 | 8.2 | 11.5 | 14.2 | 16.6 | 18.8 | 20.6 | 22.3 | 23.8 | 25.2 | 26.4 | 27.6 | 28.6 | 0.0 | 0.0 |
| 60 | 0.0 | 3.8 | 7.0 | 9.7 | 12.2 | 14.3 | 16.2 | 17.8 | 19.4 | 20.7 | 22.0 | 23.1 | 24.1 | 0.0 | 0.0 | 0.0 |
| 70 | 0.0 | 3.2 | 6.0 | 8.4 | 10.5 | 12.4 | 14.1 | 15.6 | 17.0 | 18.2 | 19.3 | 20.3 | 0.0 | 0.0 | 0.0 | 0.0 |
| 80 | 0.0 | 2.8 | 5.2 | 7.3 | 9.2 | 10.9 | 12.4 | 13.7 | 15.0 | 16.1 | 17.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 90 | 0.0 | 2.4 | 4.5 | 6.4 | 8.1 | 9.6 | 11.0 | 12.2 | 13.3 | 14.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100 | 0.0 | 2.1 | 4.0 | 5.7 | 7.2 | 8.6 | 9.8 | 10.9 | 11.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110 | 0.0 | 1.9 | 3.6 | 5.1 | 6.4 | 7.7 | 8.8 | 9.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120 | 0.0 | 1.7 | 3.2 | 4.6 | 5.8 | 6.9 | 7.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130 | 0.0 | 1.5 | 2.9 | 4.1 | 5.2 | 6.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140 | 0.0 | 1.4 | 2.6 | 3.7 | 4.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150 | 0.0 | 1.2 | 2.4 | 3.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

### PREDICTED YIELD INCREASE (BU/AC) TABLE

CROP=SOFT WHEAT | IRRIGATION=OPTIUM

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 12.8 | 23.4 | 32.3 | 39.9 | 46.4 | 52.1 | 57.2 | 61.6 | 65.6 | 69.2 | 72.4 | 75.3 | 78.0 | 80.4 | 82.7 |
| 20 | 0.0 | 10.6 | 19.5 | 27.1 | 33.6 | 39.4 | 44.4 | 48.8 | 52.8 | 56.4 | 59.6 | 62.5 | 65.2 | 67.7 | 69.9 | 72.0 |
| 30 | 0.0 | 8.9 | 16.5 | 23.1 | 28.8 | 33.8 | 38.3 | 42.2 | 45.8 | 49.0 | 52.0 | 54.6 | 57.1 | 59.3 | 61.4 | 63.3 |
| 40 | 0.0 | 7.6 | 14.2 | 19.9 | 24.9 | 29.4 | 33.3 | 36.9 | 40.1 | 43.1 | 45.7 | 48.2 | 50.4 | 52.5 | 54.4 | 56.2 |
| 50 | 0.0 | 6.6 | 12.3 | 17.3 | 21.8 | 25.7 | 29.3 | 32.5 | 35.5 | 38.1 | 40.6 | 42.8 | 44.9 | 46.8 | 48.6 | 50.2 |
| 60 | 0.0 | 5.7 | 10.7 | 15.2 | 19.2 | 22.8 | 26.0 | 28.9 | 31.6 | 34.0 | 36.3 | 38.3 | 40.2 | 42.0 | 43.7 | 45.2 |
| 70 | 0.0 | 5.0 | 9.5 | 13.5 | 17.0 | 20.3 | 23.2 | 25.9 | 28.3 | 30.5 | 32.6 | 34.5 | 36.3 | 37.9 | 39.5 | 40.9 |
| 80 | 0.0 | 4.5 | 8.4 | 12.0 | 15.2 | 18.2 | 20.8 | 23.3 | 25.5 | 27.6 | 29.5 | 31.3 | 32.9 | 34.5 | 35.9 | 37.2 |
| 90 | 0.0 | 4.0 | 7.5 | 10.8 | 13.7 | 16.4 | 18.8 | 21.1 | 23.1 | 25.0 | 26.8 | 28.5 | 30.0 | 31.4 | 32.8 | 34.0 |
| 100 | 0.0 | 3.6 | 6.8 | 9.7 | 12.4 | 14.8 | 17.1 | 19.1 | 21.1 | 22.8 | 24.5 | 26.0 | 27.5 | 28.8 | 30.1 | 31.3 |
| 110 | 0.0 | 3.2 | 6.2 | 8.8 | 11.3 | 13.5 | 15.6 | 17.5 | 19.3 | 20.9 | 22.4 | 23.9 | 25.2 | 26.5 | 27.7 | 28.8 |
| 120 | 0.0 | 2.9 | 5.6 | 8.0 | 10.3 | 12.3 | 14.3 | 16.0 | 17.7 | 19.2 | 20.7 | 22.0 | 23.3 | 24.5 | 25.6 | 26.6 |
| 130 | 0.0 | 2.7 | 5.1 | 7.4 | 9.4 | 11.3 | 13.1 | 14.8 | 16.3 | 17.7 | 19.1 | 20.3 | 21.5 | 22.7 | 23.7 | 0.0 |
| 140 | 0.0 | 2.4 | 4.7 | 6.8 | 8.7 | 10.4 | 12.1 | 13.6 | 15.1 | 16.4 | 17.7 | 18.9 | 20.0 | 21.0 | 0.0 | 0.0 |
| 150 | 0.0 | 2.2 | 4.3 | 6.2 | 8.0 | 9.6 | 11.2 | 12.6 | 14.0 | 15.2 | 16.4 | 17.5 | 18.6 | 0.0 | 0.0 | 0.0 |

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ADDED YIELD INCREASE (BU/AC) TABLE

CROP=SOFT WHEAT | IRRIGATION=AVERAGE

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 11.0 | 8.4 | 6.7 | 5.4 | 4.5 | 3.8 | 3.2 | 2.8 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 | 1.2 |
| 20 | 0.0 | 8.4 | 6.7 | 5.4 | 4.5 | 3.8 | 3.2 | 2.8 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 | 1.2 | 1.1 |
| 30 | 0.0 | 6.7 | 5.4 | 4.5 | 3.8 | 3.2 | 2.8 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 |
| 40 | 0.0 | 5.4 | 4.5 | 3.8 | 3.2 | 2.8 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 |
| 50 | 0.0 | 4.5 | 3.8 | 3.2 | 2.8 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 |
| 60 | 0.0 | 3.8 | 3.2 | 2.8 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 |
| 70 | 0.0 | 3.2 | 2.8 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 80 | 0.0 | 2.8 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 90 | 0.0 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100 | 0.0 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110 | 0.0 | 1.9 | 1.7 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120 | 0.0 | 1.7 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130 | 0.0 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140 | 0.0 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150 | 0.0 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

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ADDED YIELD INCREASE (BU/AC) TABLE

CROP=SOFT WHEAT | IRRIGATION=OPTIUM

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 12.8 | 10.6 | 8.9 | 7.6 | 6.6 | 5.7 | 5.0 | 4.5 | 4.0 | 3.6 | 3.2 | 2.9 | 2.7 | 2.4 | 2.2 |
| 20 | 0.0 | 10.6 | 8.9 | 7.6 | 6.6 | 5.7 | 5.0 | 4.5 | 4.0 | 3.6 | 3.2 | 2.9 | 2.7 | 2.4 | 2.2 | 2.1 |
| 30 | 0.0 | 8.9 | 7.6 | 6.6 | 5.7 | 5.0 | 4.5 | 4.0 | 3.6 | 3.2 | 2.9 | 2.7 | 2.4 | 2.2 | 2.1 | 1.9 |
| 40 | 0.0 | 7.6 | 6.6 | 5.7 | 5.0 | 4.5 | 4.0 | 3.6 | 3.2 | 2.9 | 2.7 | 2.4 | 2.2 | 2.1 | 1.9 | 1.8 |
| 50 | 0.0 | 6.6 | 5.7 | 5.0 | 4.5 | 4.0 | 3.6 | 3.2 | 2.9 | 2.7 | 2.4 | 2.2 | 2.1 | 1.9 | 1.8 | 1.7 |
| 60 | 0.0 | 5.7 | 5.0 | 4.5 | 4.0 | 3.6 | 3.2 | 2.9 | 2.7 | 2.4 | 2.2 | 2.1 | 1.9 | 1.8 | 1.7 | 1.5 |
| 70 | 0.0 | 5.0 | 4.5 | 4.0 | 3.6 | 3.2 | 2.9 | 2.7 | 2.4 | 2.2 | 2.1 | 1.9 | 1.8 | 1.7 | 1.5 | 1.4 |
| 80 | 0.0 | 4.5 | 4.0 | 3.6 | 3.2 | 2.9 | 2.7 | 2.4 | 2.2 | 2.1 | 1.9 | 1.8 | 1.7 | 1.5 | 1.4 | 1.3 |
| 90 | 0.0 | 4.0 | 3.6 | 3.2 | 2.9 | 2.7 | 2.4 | 2.2 | 2.1 | 1.9 | 1.8 | 1.7 | 1.5 | 1.4 | 1.3 | 1.3 |
| 100 | 0.0 | 3.6 | 3.2 | 2.9 | 2.7 | 2.4 | 2.2 | 2.1 | 1.9 | 1.8 | 1.7 | 1.5 | 1.4 | 1.3 | 1.3 | 1.2 |
| 110 | 0.0 | 3.2 | 2.9 | 2.7 | 2.4 | 2.2 | 2.1 | 1.9 | 1.8 | 1.7 | 1.5 | 1.4 | 1.3 | 1.3 | 1.2 | 1.1 |
| 120 | 0.0 | 2.9 | 2.7 | 2.4 | 2.2 | 2.1 | 1.9 | 1.8 | 1.7 | 1.5 | 1.4 | 1.3 | 1.3 | 1.2 | 1.1 | 1.1 |
| 130 | 0.0 | 2.7 | 2.4 | 2.2 | 2.1 | 1.9 | 1.8 | 1.7 | 1.5 | 1.4 | 1.3 | 1.3 | 1.2 | 1.1 | 1.1 | 0.0 |
| 140 | 0.0 | 2.4 | 2.2 | 2.1 | 1.9 | 1.8 | 1.7 | 1.5 | 1.4 | 1.3 | 1.3 | 1.2 | 1.1 | 1.1 | 0.0 | 0.0 |
| 150 | 0.0 | 2.2 | 2.1 | 1.9 | 1.8 | 1.7 | 1.5 | 1.4 | 1.3 | 1.3 | 1.2 | 1.1 | 1.1 | 0.0 | 0.0 | 0.0 |

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PREDICTED YIELD INCREASE (BU/AC) TABLE

CROP=HRS WHEAT | IRRIGATION=AVERAGE

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 9.8 | 17.0 | 22.5 | 26.9 | 30.5 | 33.4 | 35.9 | 38.0 | 39.9 | 41.5 | 42.9 | 44.1 | 45.2 | 46.2 | 0.0 |
| 20 | 0.0 | 7.2 | 12.7 | 17.1 | 20.7 | 23.7 | 26.1 | 28.3 | 30.1 | 31.7 | 33.1 | 34.4 | 35.5 | 36.5 | 0.0 | 0.0 |
| 30 | 0.0 | 5.5 | 9.9 | 13.5 | 16.5 | 18.9 | 21.1 | 22.9 | 24.5 | 25.9 | 27.1 | 28.3 | 29.3 | 0.0 | 0.0 | 0.0 |
| 40 | 0.0 | 4.4 | 8.0 | 10.9 | 13.4 | 15.5 | 17.4 | 19.0 | 20.4 | 21.6 | 22.7 | 23.7 | 0.0 | 0.0 | 0.0 | 0.0 |
| 50 | 0.0 | 3.6 | 6.5 | 9.0 | 11.1 | 13.0 | 14.6 | 16.0 | 17.2 | 18.3 | 19.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 60 | 0.0 | 3.0 | 5.4 | 7.6 | 9.4 | 11.0 | 12.4 | 13.6 | 14.8 | 15.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 70 | 0.0 | 2.5 | 4.6 | 6.4 | 8.0 | 9.4 | 10.7 | 11.8 | 12.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 80 | 0.0 | 2.1 | 4.0 | 5.6 | 7.0 | 8.2 | 9.3 | 10.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 90 | 0.0 | 1.8 | 3.4 | 4.8 | 6.1 | 7.2 | 8.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100 | 0.0 | 1.6 | 3.0 | 4.3 | 5.4 | 6.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110 | 0.0 | 1.4 | 2.7 | 3.8 | 4.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120 | 0.0 | 1.2 | 2.4 | 3.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130 | 0.0 | 1.1 | 2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140 | 0.0 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

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PREDICTED YIELD INCREASE (BU/AC) TABLE

CROP=HRS WHEAT | IRRIGATION=OPTIUM

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 11.1 | 19.8 | 26.7 | 32.5 | 37.3 | 41.4 | 44.9 | 47.9 | 50.6 | 53.0 | 55.1 | 57.0 | 58.7 | 60.2 | 61.6 |
| 20 | 0.0 | 8.7 | 15.7 | 21.4 | 26.2 | 30.3 | 33.8 | 36.9 | 39.5 | 41.9 | 44.0 | 45.9 | 47.6 | 49.1 | 50.5 | 51.8 |
| 30 | 0.0 | 7.0 | 12.7 | 17.5 | 21.6 | 25.1 | 28.2 | 30.9 | 33.2 | 35.3 | 37.2 | 38.9 | 40.5 | 41.9 | 43.1 | 44.3 |
| 40 | 0.0 | 5.7 | 10.6 | 14.6 | 18.1 | 21.2 | 23.9 | 26.2 | 28.3 | 30.2 | 31.9 | 33.5 | 34.9 | 36.1 | 37.3 | 38.4 |
| 50 | 0.0 | 4.8 | 8.9 | 12.4 | 15.4 | 18.1 | 20.5 | 22.6 | 24.5 | 26.2 | 27.7 | 29.1 | 30.4 | 31.6 | 32.7 | 33.7 |
| 60 | 0.0 | 4.1 | 7.6 | 10.6 | 13.3 | 15.7 | 17.8 | 19.7 | 21.4 | 22.9 | 24.3 | 25.6 | 26.8 | 27.9 | 28.9 | 0.0 |
| 70 | 0.0 | 3.5 | 6.6 | 9.2 | 11.6 | 13.7 | 15.6 | 17.3 | 18.8 | 20.2 | 21.5 | 22.7 | 23.8 | 24.8 | 0.0 | 0.0 |
| 80 | 0.0 | 3.0 | 5.7 | 8.1 | 10.2 | 12.1 | 13.8 | 15.3 | 16.7 | 18.0 | 19.2 | 20.3 | 21.3 | 0.0 | 0.0 | 0.0 |
| 90 | 0.0 | 2.7 | 5.0 | 7.1 | 9.0 | 10.7 | 12.3 | 13.7 | 15.0 | 16.1 | 17.2 | 18.2 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100 | 0.0 | 2.4 | 4.5 | 6.4 | 8.1 | 9.6 | 11.0 | 12.3 | 13.5 | 14.5 | 15.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110 | 0.0 | 2.1 | 4.0 | 5.7 | 7.2 | 8.6 | 9.9 | 11.1 | 12.2 | 13.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120 | 0.0 | 1.9 | 3.6 | 5.1 | 6.5 | 7.8 | 9.0 | 10.1 | 11.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130 | 0.0 | 1.7 | 3.2 | 4.6 | 5.9 | 7.1 | 8.2 | 9.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140 | 0.0 | 1.5 | 2.9 | 4.2 | 5.4 | 6.5 | 7.5 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150 | 0.0 | 1.4 | 2.7 | 3.9 | 4.9 | 5.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

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ADDED YIELD INCREASE (BU/AC) TABLE

CROP=HRS WHEAT | IRRIGATION=AVERAGE

| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 9.8 | 7.2 | 5.5 | 4.4 | 3.6 | 3.0 | 2.5 | 2.1 | 1.8 | 1.6 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 |
| 20 | 0.0 | 7.2 | 5.5 | 4.4 | 3.6 | 3.0 | 2.5 | 2.1 | 1.8 | 1.6 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 |
| 30 | 0.0 | 5.5 | 4.4 | 3.6 | 3.0 | 2.5 | 2.1 | 1.8 | 1.6 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 |
| 40 | 0.0 | 4.4 | 3.6 | 3.0 | 2.5 | 2.1 | 1.8 | 1.6 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 50 | 0.0 | 3.6 | 3.0 | 2.5 | 2.1 | 1.8 | 1.6 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 60 | 0.0 | 3.0 | 2.5 | 2.1 | 1.8 | 1.6 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 70 | 0.0 | 2.5 | 2.1 | 1.8 | 1.6 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 80 | 0.0 | 2.1 | 1.8 | 1.6 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 90 | 0.0 | 1.8 | 1.6 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100 | 0.0 | 1.6 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110 | 0.0 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120 | 0.0 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130 | 0.0 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140 | 0.0 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

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ADDED YIELD INCREASE (BU/AC) TABLE

CROP=HRS WHEAT | IRRIGATION=OPTIUM

| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 11.1 | 8.7 | 7.0 | 5.7 | 4.8 | 4.1 | 3.5 | 3.0 | 2.7 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 |
| 20 | 0.0 | 8.7 | 7.0 | 5.7 | 4.8 | 4.1 | 3.5 | 3.0 | 2.7 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 | 1.3 |
| 30 | 0.0 | 7.0 | 5.7 | 4.8 | 4.1 | 3.5 | 3.0 | 2.7 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 | 1.3 | 1.2 |
| 40 | 0.0 | 5.7 | 4.8 | 4.1 | 3.5 | 3.0 | 2.7 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 | 1.3 | 1.2 | 1.1 |
| 50 | 0.0 | 4.8 | 4.1 | 3.5 | 3.0 | 2.7 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 |
| 60 | 0.0 | 4.1 | 3.5 | 3.0 | 2.7 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 |
| 70 | 0.0 | 3.5 | 3.0 | 2.7 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 |
| 80 | 0.0 | 3.0 | 2.7 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 |
| 90 | 0.0 | 2.7 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100 | 0.0 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110 | 0.0 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120 | 0.0 | 1.9 | 1.7 | 1.5 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130 | 0.0 | 1.7 | 1.5 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140 | 0.0 | 1.5 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150 | 0.0 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

PREDICTED YIELD INCREASE (BU/AC) TABLE .

CROP=3M WHEAT | IRRIGATION=AVERAGE

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 11.1 | 19.5 | 26.2 | 31.6 | 36.0 | 39.8 | 43.0 | 45.7 | 48.1 | 50.2 | 52.1 | 53.8 | 55.2 | 56.6 | 57.8 |
| 20 | 0.0 | 8.5 | 15.1 | 20.5 | 25.0 | 28.7 | 31.9 | 34.7 | 37.1 | 39.2 | 41.0 | 42.7 | 44.2 | 45.5 | 46.7 | 47.9 |
| 30 | 0.0 | 6.7 | 12.1 | 16.5 | 20.3 | 23.5 | 26.2 | 28.6 | 30.7 | 32.6 | 34.2 | 35.7 | 37.1 | 38.3 | 39.4 | 40.4 |
| 40 | 0.0 | 5.4 | 9.9 | 13.6 | 16.8 | 19.5 | 21.9 | 24.0 | 25.9 | 27.6 | 29.1 | 30.4 | 31.6 | 32.7 | 33.7 | 0.0 |
| 50 | 0.0 | 4.5 | 8.2 | 11.4 | 14.1 | 16.5 | 18.6 | 20.5 | 22.2 | 23.7 | 25.0 | 26.2 | 27.3 | 28.3 | 0.0 | 0.0 |
| 60 | 0.0 | 3.7 | 6.9 | 9.7 | 12.1 | 14.2 | 16.0 | 17.7 | 19.2 | 20.5 | 21.8 | 22.9 | 23.9 | 0.0 | 0.0 | 0.0 |
| 70 | 0.0 | 3.2 | 5.9 | 8.3 | 10.4 | 12.3 | 14.0 | 15.5 | 16.8 | 18.0 | 19.1 | 20.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| 80 | 0.0 | 2.7 | 5.1 | 7.2 | 9.1 | 10.8 | 12.3 | 13.6 | 14.8 | 15.9 | 17.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 90 | 0.0 | 2.4 | 4.5 | 6.4 | 8.0 | 9.5 | 10.9 | 12.1 | 13.2 | 14.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100 | 0.0 | 2.1 | 4.0 | 5.6 | 7.1 | 8.5 | 9.7 | 10.8 | 11.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110 | 0.0 | 1.9 | 3.5 | 5.0 | 6.4 | 7.6 | 8.7 | 9.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120 | 0.0 | 1.7 | 3.2 | 4.5 | 5.7 | 6.8 | 7.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130 | 0.0 | 1.5 | 2.8 | 4.1 | 5.2 | 6.2 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140 | 0.0 | 1.3 | 2.6 | 3.7 | 4.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150 | 0.0 | 1.2 | 2.3 | 3.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

PREDICTED YIELD INCREASE (BU/AC) TABLE

CROP=3M WHEAT | IRRIGATION=OPTIUM

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 13.6 | 25.1 | 34.9 | 43.5 | 51.0 | 57.6 | 63.5 | 68.8 | 73.5 | 77.8 | 81.7 | 85.3 | 88.6 | 91.6 | 94.4 |
| 20 | 0.0 | 11.5 | 21.4 | 29.9 | 37.4 | 44.0 | 49.9 | 55.2 | 59.9 | 64.2 | 68.1 | 71.7 | 75.0 | 78.0 | 80.8 | 83.4 |
| 30 | 0.0 | 9.9 | 18.4 | 25.9 | 32.5 | 38.4 | 43.7 | 48.4 | 52.7 | 56.7 | 60.2 | 63.5 | 66.5 | 69.3 | 71.9 | 74.3 |
| 40 | 0.0 | 8.6 | 16.1 | 22.7 | 28.6 | 33.8 | 38.6 | 42.9 | 46.8 | 50.4 | 53.6 | 56.7 | 59.4 | 62.0 | 64.4 | 66.6 |
| 50 | 0.0 | 7.5 | 14.1 | 20.0 | 25.3 | 30.0 | 34.3 | 38.2 | 41.8 | 45.1 | 48.1 | 50.9 | 53.5 | 55.9 | 58.1 | 60.2 |
| 60 | 0.0 | 6.6 | 12.5 | 17.8 | 22.5 | 26.8 | 30.7 | 34.3 | 37.6 | 40.6 | 43.4 | 46.0 | 48.4 | 50.6 | 52.7 | 54.6 |
| 70 | 0.0 | 5.9 | 11.2 | 15.9 | 20.2 | 24.1 | 27.7 | 31.0 | 34.0 | 36.8 | 39.3 | 41.7 | 44.0 | 46.0 | 48.0 | 49.8 |
| 80 | 0.0 | 5.3 | 10.0 | 14.3 | 18.2 | 21.8 | 25.1 | 28.1 | 30.9 | 33.5 | 35.8 | 38.1 | 40.2 | 42.1 | 43.9 | 45.7 |
| 90 | 0.0 | 4.7 | 9.0 | 13.0 | 16.5 | 19.8 | 22.8 | 25.6 | 28.2 | 30.6 | 32.8 | 34.9 | 36.8 | 38.7 | 40.4 | 42.0 |
| 100 | 0.0 | 4.3 | 8.2 | 11.8 | 15.1 | 18.1 | 20.9 | 23.4 | 25.8 | 28.1 | 30.1 | 32.1 | 33.9 | 35.6 | 37.2 | 38.8 |
| 110 | 0.0 | 3.9 | 7.5 | 10.8 | 13.8 | 16.6 | 19.1 | 21.5 | 23.8 | 25.8 | 27.8 | 29.6 | 31.3 | 32.9 | 34.5 | 35.9 |
| 120 | 0.0 | 3.6 | 6.8 | 9.9 | 12.6 | 15.2 | 17.6 | 19.8 | 21.9 | 23.9 | 25.7 | 27.4 | 29.0 | 30.6 | 32.0 | 33.4 |
| 130 | 0.0 | 3.3 | 6.3 | 9.1 | 11.7 | 14.0 | 16.3 | 18.4 | 20.3 | 22.1 | 23.8 | 25.5 | 27.0 | 28.4 | 29.8 | 31.1 |
| 140 | 0.0 | 3.0 | 5.8 | 8.4 | 10.8 | 13.0 | 15.1 | 17.0 | 18.9 | 20.6 | 22.2 | 23.7 | 25.2 | 26.5 | 27.8 | 29.0 |
| 150 | 0.0 | 2.8 | 5.4 | 7.8 | 10.0 | 12.1 | 14.0 | 15.8 | 17.6 | 19.2 | 20.7 | 22.1 | 23.5 | 24.8 | 26.0 | 27.2 |

ADDED YIELD INCREASE (BU/AC) TABLE

CROP=3M WHEAT | IRRIGATION=AVERAGE

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 11.1 | 8.5 | 6.7 | 5.4 | 4.5 | 3.7 | 3.2 | 2.7 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.3 | 1.2 |
| 20 | 0.0 | 8.5 | 6.7 | 5.4 | 4.5 | 3.7 | 3.2 | 2.7 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.3 | 1.2 | 1.1 |
| 30 | 0.0 | 6.7 | 5.4 | 4.5 | 3.7 | 3.2 | 2.7 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.3 | 1.2 | 1.1 | 1.0 |
| 40 | 0.0 | 5.4 | 4.5 | 3.7 | 3.2 | 2.7 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 |
| 50 | 0.0 | 4.5 | 3.7 | 3.2 | 2.7 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 |
| 60 | 0.0 | 3.7 | 3.2 | 2.7 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 |
| 70 | 0.0 | 3.2 | 2.7 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 80 | 0.0 | 2.7 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 90 | 0.0 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100 | 0.0 | 2.1 | 1.9 | 1.7 | 1.5 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110 | 0.0 | 1.9 | 1.7 | 1.5 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120 | 0.0 | 1.7 | 1.5 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130 | 0.0 | 1.5 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140 | 0.0 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150 | 0.0 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

ADDED YIELD INCREASE (BU/AC) TABLE

CROP=3M WHEAT | IRRIGATION=OPTIUM

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 13.6 | 11.5 | 9.9 | 8.6 | 7.5 | 6.6 | 5.9 | 5.3 | 4.7 | 4.3 | 3.9 | 3.6 | 3.3 | 3.0 | 2.8 |
| 20 | 0.0 | 11.5 | 9.9 | 8.6 | 7.5 | 6.6 | 5.9 | 5.3 | 4.7 | 4.3 | 3.9 | 3.6 | 3.3 | 3.0 | 2.8 | 2.6 |
| 30 | 0.0 | 9.9 | 8.6 | 7.5 | 6.6 | 5.9 | 5.3 | 4.7 | 4.3 | 3.9 | 3.6 | 3.3 | 3.0 | 2.8 | 2.6 | 2.4 |
| 40 | 0.0 | 8.6 | 7.5 | 6.6 | 5.9 | 5.3 | 4.7 | 4.3 | 3.9 | 3.6 | 3.3 | 3.0 | 2.8 | 2.6 | 2.4 | 2.2 |
| 50 | 0.0 | 7.5 | 6.6 | 5.9 | 5.3 | 4.7 | 4.3 | 3.9 | 3.6 | 3.3 | 3.0 | 2.8 | 2.6 | 2.4 | 2.2 | 2.1 |
| 60 | 0.0 | 6.6 | 5.9 | 5.3 | 4.7 | 4.3 | 3.9 | 3.6 | 3.3 | 3.0 | 2.8 | 2.6 | 2.4 | 2.2 | 2.1 | 1.9 |
| 70 | 0.0 | 5.9 | 5.3 | 4.7 | 4.3 | 3.9 | 3.6 | 3.3 | 3.0 | 2.8 | 2.6 | 2.4 | 2.2 | 2.1 | 1.9 | 1.8 |
| 80 | 0.0 | 5.3 | 4.7 | 4.3 | 3.9 | 3.6 | 3.3 | 3.0 | 2.8 | 2.6 | 2.4 | 2.2 | 2.1 | 1.9 | 1.8 | 1.7 |
| 90 | 0.0 | 4.7 | 4.3 | 3.9 | 3.6 | 3.3 | 3.0 | 2.8 | 2.6 | 2.4 | 2.2 | 2.1 | 1.9 | 1.8 | 1.7 | 1.6 |
| 100 | 0.0 | 4.3 | 3.9 | 3.6 | 3.3 | 3.0 | 2.8 | 2.6 | 2.4 | 2.2 | 2.1 | 1.9 | 1.8 | 1.7 | 1.6 | 1.5 |
| 110 | 0.0 | 3.9 | 3.6 | 3.3 | 3.0 | 2.8 | 2.6 | 2.4 | 2.2 | 2.1 | 1.9 | 1.8 | 1.7 | 1.6 | 1.5 | 1.4 |
| 120 | 0.0 | 3.6 | 3.3 | 3.0 | 2.8 | 2.6 | 2.4 | 2.2 | 2.1 | 1.9 | 1.8 | 1.7 | 1.6 | 1.5 | 1.4 | 1.4 |
| 130 | 0.0 | 3.3 | 3.0 | 2.8 | 2.6 | 2.4 | 2.2 | 2.1 | 1.9 | 1.8 | 1.7 | 1.6 | 1.5 | 1.4 | 1.4 | 1.3 |
| 140 | 0.0 | 3.0 | 2.8 | 2.6 | 2.4 | 2.2 | 2.1 | 1.9 | 1.8 | 1.7 | 1.6 | 1.5 | 1.4 | 1.4 | 1.3 | 1.2 |
| 150 | 0.0 | 2.8 | 2.6 | 2.4 | 2.2 | 2.1 | 1.9 | 1.8 | 1.7 | 1.6 | 1.5 | 1.4 | 1.4 | 1.3 | 1.2 | 1.2 |

## PREDICTED YIELD INCREASE (BU/AC) TABLE

CROP=OATS | IRRIGATION=AVERAGE

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 13.5 | 23.6 | 31.5 | 37.9 | 43.0 | 47.4 | 51.0 | 54.2 | 56.9 | 59.3 | 61.4 | 63.2 | 64.9 | 66.4 | 67.8 |
| 20 | 0.0 | 10.1 | 18.0 | 24.4 | 29.5 | 33.9 | 37.5 | 40.7 | 43.4 | 45.7 | 47.8 | 49.7 | 51.4 | 52.9 | 54.2 | 55.5 |
| 30 | 0.0 | 7.9 | 14.2 | 19.4 | 23.7 | 27.4 | 30.5 | 33.2 | 35.6 | 37.7 | 39.6 | 41.2 | 42.7 | 44.1 | 45.3 | 46.5 |
| 40 | 0.0 | 6.3 | 11.5 | 15.8 | 19.5 | 22.6 | 25.3 | 27.7 | 29.8 | 31.7 | 33.3 | 34.8 | 36.2 | 37.4 | 38.6 | 39.6 |
| 50 | 0.0 | 5.2 | 9.5 | 13.2 | 16.3 | 19.0 | 21.4 | 23.5 | 25.3 | 27.0 | 28.5 | 29.9 | 31.1 | 32.2 | 33.3 | 0.0 |
| 60 | 0.0 | 4.3 | 8.0 | 11.1 | 13.8 | 16.2 | 18.3 | 20.2 | 21.8 | 23.3 | 24.7 | 25.9 | 27.1 | 28.1 | 0.0 | 0.0 |
| 70 | 0.0 | 3.7 | 6.8 | 9.5 | 11.9 | 14.0 | 15.8 | 17.5 | 19.0 | 20.4 | 21.6 | 22.8 | 23.8 | 0.0 | 0.0 | 0.0 |
| 80 | 0.0 | 3.1 | 5.9 | 8.2 | 10.3 | 12.2 | 13.9 | 15.4 | 16.7 | 18.0 | 19.1 | 20.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| 90 | 0.0 | 2.7 | 5.1 | 7.2 | 9.1 | 10.7 | 12.2 | 13.6 | 14.8 | 16.0 | 17.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100 | 0.0 | 2.4 | 4.5 | 6.3 | 8.0 | 9.5 | 10.9 | 12.1 | 13.2 | 14.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110 | 0.0 | 2.1 | 4.0 | 5.6 | 7.1 | 8.5 | 9.7 | 10.9 | 11.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120 | 0.0 | 1.9 | 3.5 | 5.0 | 6.4 | 7.6 | 8.8 | 9.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130 | 0.0 | 1.7 | 3.2 | 4.5 | 5.8 | 6.9 | 7.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140 | 0.0 | 1.5 | 2.9 | 4.1 | 5.2 | 6.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150 | 0.0 | 1.4 | 2.6 | 3.7 | 4.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

## PREDICTED YIELD INCREASE (BU/AC) TABLE

CROP=OATS | IRRIGATION=OPTIUM

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 16.2 | 29.5 | 40.5 | 50.0 | 58.0 | 65.0 | 71.2 | 76.6 | 81.4 | 85.8 | 89.7 | 93.2 | 96.4 | 99.3 | 102.0 |
| 20 | 0.0 | 13.3 | 24.4 | 33.8 | 41.9 | 48.9 | 55.0 | 60.4 | 65.3 | 69.6 | 73.5 | 77.0 | 80.2 | 83.1 | 85.8 | 88.3 |
| 30 | 0.0 | 11.1 | 20.5 | 28.6 | 35.6 | 41.7 | 47.2 | 52.0 | 56.3 | 60.2 | 63.7 | 66.9 | 69.9 | 72.6 | 75.0 | 77.3 |
| 40 | 0.0 | 9.4 | 17.5 | 24.5 | 30.6 | 36.1 | 40.9 | 45.2 | 49.1 | 52.6 | 55.8 | 58.8 | 61.5 | 63.9 | 66.2 | 68.3 |
| 50 | 0.0 | 8.1 | 15.1 | 21.2 | 26.7 | 31.5 | 35.8 | 39.7 | 43.2 | 46.4 | 49.4 | 52.1 | 54.5 | 56.8 | 58.9 | 60.9 |
| 60 | 0.0 | 7.0 | 13.2 | 18.6 | 23.4 | 27.7 | 31.6 | 35.2 | 38.4 | 41.3 | 44.0 | 46.5 | 48.7 | 50.9 | 52.8 | 54.7 |
| 70 | 0.0 | 6.1 | 11.6 | 16.4 | 20.7 | 24.6 | 28.1 | 31.4 | 34.3 | 37.0 | 39.4 | 41.7 | 43.8 | 45.8 | 47.6 | 49.4 |
| 80 | 0.0 | 5.4 | 10.3 | 14.6 | 18.5 | 22.0 | 25.2 | 28.1 | 30.8 | 33.3 | 35.6 | 37.7 | 39.7 | 41.5 | 43.2 | 44.8 |
| 90 | 0.0 | 4.8 | 9.2 | 13.0 | 16.6 | 19.8 | 22.7 | 25.4 | 27.9 | 30.2 | 32.3 | 34.2 | 36.1 | 37.8 | 39.4 | 40.9 |
| 100 | 0.0 | 4.3 | 8.2 | 11.7 | 15.0 | 17.9 | 20.6 | 23.0 | 25.3 | 27.5 | 29.4 | 31.2 | 33.0 | 34.6 | 36.1 | 37.5 |
| 110 | 0.0 | 3.9 | 7.4 | 10.6 | 13.6 | 16.2 | 18.7 | 21.0 | 23.1 | 25.1 | 26.9 | 28.6 | 30.2 | 31.7 | 33.1 | 34.5 |
| 120 | 0.0 | 3.5 | 6.7 | 9.7 | 12.4 | 14.8 | 17.1 | 19.2 | 21.2 | 23.0 | 24.7 | 26.3 | 27.8 | 29.3 | 30.6 | 31.8 |
| 130 | 0.0 | 3.2 | 6.1 | 8.8 | 11.3 | 13.6 | 15.7 | 17.7 | 19.5 | 21.2 | 22.8 | 24.3 | 25.7 | 27.1 | 28.3 | 29.5 |
| 140 | 0.0 | 2.9 | 5.6 | 8.1 | 10.4 | 12.5 | 14.5 | 16.3 | 18.0 | 19.6 | 21.1 | 22.5 | 23.8 | 25.1 | 26.3 | 27.4 |
| 150 | 0.0 | 2.7 | 5.2 | 7.4 | 9.6 | 11.5 | 13.4 | 15.1 | 16.7 | 18.2 | 19.6 | 20.9 | 22.2 | 23.3 | 24.5 | 25.5 |

ADDED YIELD INCREASE (BU/AC) TABLE

CROP=OATS | IRRIGATION=AVERAGE

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 13.5 | 10.1 | 7.9 | 6.3 | 5.2 | 4.3 | 3.7 | 3.1 | 2.7 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 |
| 20 | 0.0 | 10.1 | 7.9 | 6.3 | 5.2 | 4.3 | 3.7 | 3.1 | 2.7 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 | 1.2 |
| 30 | 0.0 | 7.9 | 6.3 | 5.2 | 4.3 | 3.7 | 3.1 | 2.7 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 | 1.2 | 1.1 |
| 40 | 0.0 | 6.3 | 5.2 | 4.3 | 3.7 | 3.1 | 2.7 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 |
| 50 | 0.0 | 5.2 | 4.3 | 3.7 | 3.1 | 2.7 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 |
| 60 | 0.0 | 4.3 | 3.7 | 3.1 | 2.7 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 |
| 70 | 0.0 | 3.7 | 3.1 | 2.7 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 |
| 80 | 0.0 | 3.1 | 2.7 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 90 | 0.0 | 2.7 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100 | 0.0 | 2.4 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110 | 0.0 | 2.1 | 1.9 | 1.7 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120 | 0.0 | 1.9 | 1.7 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130 | 0.0 | 1.7 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140 | 0.0 | 1.5 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150 | 0.0 | 1.4 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

ADDED YIELD INCREASE (BU/AC) TABLE

CROP=OATS | IRRIGATION=OPTIUM

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 16.2 | 13.3 | 11.1 | 9.4 | 8.1 | 7.0 | 6.1 | 5.4 | 4.8 | 4.3 | 3.9 | 3.5 | 3.2 | 2.9 | 2.7 |
| 20 | 0.0 | 13.3 | 11.1 | 9.4 | 8.1 | 7.0 | 6.1 | 5.4 | 4.8 | 4.3 | 3.9 | 3.5 | 3.2 | 2.9 | 2.7 | 2.5 |
| 30 | 0.0 | 11.1 | 9.4 | 8.1 | 7.0 | 6.1 | 5.4 | 4.8 | 4.3 | 3.9 | 3.5 | 3.2 | 2.9 | 2.7 | 2.5 | 2.3 |
| 40 | 0.0 | 9.4 | 8.1 | 7.0 | 6.1 | 5.4 | 4.8 | 4.3 | 3.9 | 3.5 | 3.2 | 2.9 | 2.7 | 2.5 | 2.3 | 2.1 |
| 50 | 0.0 | 8.1 | 7.0 | 6.1 | 5.4 | 4.8 | 4.3 | 3.9 | 3.5 | 3.2 | 2.9 | 2.7 | 2.5 | 2.3 | 2.1 | 2.0 |
| 60 | 0.0 | 7.0 | 6.1 | 5.4 | 4.8 | 4.3 | 3.9 | 3.5 | 3.2 | 2.9 | 2.7 | 2.5 | 2.3 | 2.1 | 2.0 | 1.8 |
| 70 | 0.0 | 6.1 | 5.4 | 4.8 | 4.3 | 3.9 | 3.5 | 3.2 | 2.9 | 2.7 | 2.5 | 2.3 | 2.1 | 2.0 | 1.8 | 1.7 |
| 80 | 0.0 | 5.4 | 4.8 | 4.3 | 3.9 | 3.5 | 3.2 | 2.9 | 2.7 | 2.5 | 2.3 | 2.1 | 2.0 | 1.8 | 1.7 | 1.6 |
| 90 | 0.0 | 4.8 | 4.3 | 3.9 | 3.5 | 3.2 | 2.9 | 2.7 | 2.5 | 2.3 | 2.1 | 2.0 | 1.8 | 1.7 | 1.6 | 1.5 |
| 100 | 0.0 | 4.3 | 3.9 | 3.5 | 3.2 | 2.9 | 2.7 | 2.5 | 2.3 | 2.1 | 2.0 | 1.8 | 1.7 | 1.6 | 1.5 | 1.4 |
| 110 | 0.0 | 3.9 | 3.5 | 3.2 | 2.9 | 2.7 | 2.5 | 2.3 | 2.1 | 2.0 | 1.8 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 |
| 120 | 0.0 | 3.5 | 3.2 | 2.9 | 2.7 | 2.5 | 2.3 | 2.1 | 2.0 | 1.8 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 | 1.3 |
| 130 | 0.0 | 3.2 | 2.9 | 2.7 | 2.5 | 2.3 | 2.1 | 2.0 | 1.8 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 | 1.3 | 1.2 |
| 140 | 0.0 | 2.9 | 2.7 | 2.5 | 2.3 | 2.1 | 2.0 | 1.8 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 | 1.3 | 1.2 | 1.1 |
| 150 | 0.0 | 2.7 | 2.5 | 2.3 | 2.1 | 2.0 | 1.8 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 | 1.3 | 1.2 | 1.1 | 1.1 |

PREDICTED YIELD INCREASE (BU/AC) TABLE

CROP=CANOLA | IRRIGATION=AVERAGE

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 6.4 | 11.7 | 16.1 | 19.9 | 23.2 | 26.0 | 28.5 | 30.7 | 32.7 | 34.4 | 36.0 | 37.5 | 38.8 | 40.0 | 41.1 |
| 20 | 0.0 | 5.3 | 9.7 | 13.5 | 16.8 | 19.6 | 22.1 | 24.3 | 26.3 | 28.0 | 29.6 | 31.1 | 32.4 | 33.6 | 34.7 | 35.7 |
| 30 | 0.0 | 4.4 | 8.2 | 11.5 | 14.3 | 16.8 | 19.0 | 21.0 | 22.7 | 24.3 | 25.8 | 27.1 | 28.3 | 29.4 | 30.4 | 0.0 |
| 40 | 0.0 | 3.8 | 7.0 | 9.9 | 12.4 | 14.6 | 16.5 | 18.3 | 19.9 | 21.3 | 22.7 | 23.9 | 25.0 | 26.0 | 0.0 | 0.0 |
| 50 | 0.0 | 3.3 | 6.1 | 8.6 | 10.8 | 12.8 | 14.5 | 16.1 | 17.6 | 18.9 | 20.1 | 21.2 | 22.2 | 0.0 | 0.0 | 0.0 |
| 60 | 0.0 | 2.8 | 5.3 | 7.5 | 9.5 | 11.3 | 12.9 | 14.3 | 15.6 | 16.8 | 17.9 | 18.9 | 0.0 | 0.0 | 0.0 | 0.0 |
| 70 | 0.0 | 2.5 | 4.7 | 6.7 | 8.4 | 10.0 | 11.5 | 12.8 | 14.0 | 15.1 | 16.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 80 | 0.0 | 2.2 | 4.2 | 5.9 | 7.5 | 9.0 | 10.3 | 11.5 | 12.6 | 13.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 90 | 0.0 | 2.0 | 3.7 | 5.3 | 6.8 | 8.1 | 9.3 | 10.4 | 11.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100 | 0.0 | 1.8 | 3.4 | 4.8 | 6.1 | 7.3 | 8.4 | 9.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110 | 0.0 | 1.6 | 3.0 | 4.4 | 5.6 | 6.7 | 7.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120 | 0.0 | 1.4 | 2.8 | 4.0 | 5.1 | 6.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130 | 0.0 | 1.3 | 2.5 | 3.6 | 4.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140 | 0.0 | 1.2 | 2.3 | 3.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150 | 0.0 | 1.1 | 2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

PREDICTED YIELD INCREASE (BU/AC) TABLE

CROP=CANOLA | IRRIGATION=OPTIUM

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 7.1 | 13.3 | 18.8 | 23.6 | 28.0 | 31.9 | 35.4 | 38.6 | 41.5 | 44.2 | 46.7 | 48.9 | 51.0 | 53.0 | 54.8 |
| 20 | 0.0 | 6.2 | 11.7 | 16.5 | 20.9 | 24.8 | 28.3 | 31.5 | 34.4 | 37.1 | 39.5 | 41.8 | 43.9 | 45.9 | 47.7 | 49.4 |
| 30 | 0.0 | 5.5 | 10.3 | 14.7 | 18.6 | 22.1 | 25.3 | 28.2 | 30.9 | 33.3 | 35.6 | 37.7 | 39.7 | 41.5 | 43.2 | 44.7 |
| 40 | 0.0 | 4.9 | 9.2 | 13.1 | 16.6 | 19.8 | 22.7 | 25.4 | 27.9 | 30.1 | 32.2 | 34.2 | 36.0 | 37.7 | 39.3 | 40.7 |
| 50 | 0.0 | 4.3 | 8.2 | 11.8 | 15.0 | 17.9 | 20.6 | 23.0 | 25.3 | 27.4 | 29.3 | 31.1 | 32.8 | 34.4 | 35.9 | 37.3 |
| 60 | 0.0 | 3.9 | 7.4 | 10.6 | 13.5 | 16.2 | 18.7 | 20.9 | 23.0 | 25.0 | 26.8 | 28.5 | 30.1 | 31.6 | 32.9 | 34.3 |
| 70 | 0.0 | 3.5 | 6.7 | 9.6 | 12.3 | 14.8 | 17.0 | 19.1 | 21.1 | 22.9 | 24.6 | 26.2 | 27.7 | 29.0 | 30.4 | 31.6 |
| 80 | 0.0 | 3.2 | 6.1 | 8.8 | 11.3 | 13.5 | 15.6 | 17.6 | 19.4 | 21.1 | 22.7 | 24.1 | 25.5 | 26.8 | 28.1 | 29.2 |
| 90 | 0.0 | 2.9 | 5.6 | 8.1 | 10.3 | 12.4 | 14.4 | 16.2 | 17.9 | 19.5 | 20.9 | 22.3 | 23.6 | 24.9 | 26.0 | 27.1 |
| 100 | 0.0 | 2.7 | 5.1 | 7.4 | 9.5 | 11.4 | 13.3 | 15.0 | 16.5 | 18.0 | 19.4 | 20.7 | 21.9 | 23.1 | 24.2 | 25.3 |
| 110 | 0.0 | 2.5 | 4.7 | 6.8 | 8.8 | 10.6 | 12.3 | 13.9 | 15.3 | 16.7 | 18.0 | 19.3 | 20.4 | 21.5 | 22.6 | 0.0 |
| 120 | 0.0 | 2.3 | 4.4 | 6.3 | 8.1 | 9.8 | 11.4 | 12.9 | 14.3 | 15.6 | 16.8 | 18.0 | 19.1 | 20.1 | 0.0 | 0.0 |
| 130 | 0.0 | 2.1 | 4.0 | 5.9 | 7.5 | 9.1 | 10.6 | 12.0 | 13.3 | 14.5 | 15.7 | 16.8 | 17.9 | 0.0 | 0.0 | 0.0 |
| 140 | 0.0 | 1.9 | 3.8 | 5.5 | 7.0 | 8.5 | 9.9 | 11.2 | 12.4 | 13.6 | 14.7 | 15.8 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150 | 0.0 | 1.8 | 3.5 | 5.1 | 6.6 | 8.0 | 9.3 | 10.5 | 11.7 | 12.8 | 13.8 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

ADDED YIELD INCREASE (BU/AC) TABLE

CROP=CANOLA | IRRIGATION=AVERAGE

| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 6.4 | 5.3 | 4.4 | 3.8 | 3.3 | 2.8 | 2.5 | 2.2 | 2.0 | 1.8 | 1.6 | 1.4 | 1.3 | 1.2 | 1.1 |
| 20 | 0.0 | 5.3 | 4.4 | 3.8 | 3.3 | 2.8 | 2.5 | 2.2 | 2.0 | 1.8 | 1.6 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 |
| 30 | 0.0 | 4.4 | 3.8 | 3.3 | 2.8 | 2.5 | 2.2 | 2.0 | 1.8 | 1.6 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 |
| 40 | 0.0 | 3.8 | 3.3 | 2.8 | 2.5 | 2.2 | 2.0 | 1.8 | 1.6 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 |
| 50 | 0.0 | 3.3 | 2.8 | 2.5 | 2.2 | 2.0 | 1.8 | 1.6 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 |
| 60 | 0.0 | 2.8 | 2.5 | 2.2 | 2.0 | 1.8 | 1.6 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 70 | 0.0 | 2.5 | 2.2 | 2.0 | 1.8 | 1.6 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 80 | 0.0 | 2.2 | 2.0 | 1.8 | 1.6 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 90 | 0.0 | 2.0 | 1.8 | 1.6 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100 | 0.0 | 1.8 | 1.6 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110 | 0.0 | 1.6 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120 | 0.0 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130 | 0.0 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140 | 0.0 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150 | 0.0 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

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ADDED YIELD INCREASE (BU/AC) TABLE

CROP=CANOLA | IRRIGATION=OPTIUM

| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 7.1 | 6.2 | 5.5 | 4.9 | 4.3 | 3.9 | 3.5 | 3.2 | 2.9 | 2.7 | 2.5 | 2.3 | 2.1 | 1.9 | 1.8 |
| 20 | 0.0 | 6.2 | 5.5 | 4.9 | 4.3 | 3.9 | 3.5 | 3.2 | 2.9 | 2.7 | 2.5 | 2.3 | 2.1 | 1.9 | 1.8 | 1.7 |
| 30 | 0.0 | 5.5 | 4.9 | 4.3 | 3.9 | 3.5 | 3.2 | 2.9 | 2.7 | 2.5 | 2.3 | 2.1 | 1.9 | 1.8 | 1.7 | 1.6 |
| 40 | 0.0 | 4.9 | 4.3 | 3.9 | 3.5 | 3.2 | 2.9 | 2.7 | 2.5 | 2.3 | 2.1 | 1.9 | 1.8 | 1.7 | 1.6 | 1.5 |
| 50 | 0.0 | 4.3 | 3.9 | 3.5 | 3.2 | 2.9 | 2.7 | 2.5 | 2.3 | 2.1 | 1.9 | 1.8 | 1.7 | 1.6 | 1.5 | 1.4 |
| 60 | 0.0 | 3.9 | 3.5 | 3.2 | 2.9 | 2.7 | 2.5 | 2.3 | 2.1 | 1.9 | 1.8 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 |
| 70 | 0.0 | 3.5 | 3.2 | 2.9 | 2.7 | 2.5 | 2.3 | 2.1 | 1.9 | 1.8 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 | 1.2 |
| 80 | 0.0 | 3.2 | 2.9 | 2.7 | 2.5 | 2.3 | 2.1 | 1.9 | 1.8 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 | 1.2 | 1.2 |
| 90 | 0.0 | 2.9 | 2.7 | 2.5 | 2.3 | 2.1 | 1.9 | 1.8 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 | 1.2 | 1.2 | 1.1 |
| 100 | 0.0 | 2.7 | 2.5 | 2.3 | 2.1 | 1.9 | 1.8 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 | 1.2 | 1.2 | 1.1 | 1.0 |
| 110 | 0.0 | 2.5 | 2.3 | 2.1 | 1.9 | 1.8 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 | 1.2 | 1.2 | 1.1 | 1.0 | 0.0 |
| 120 | 0.0 | 2.3 | 2.1 | 1.9 | 1.8 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 | 1.2 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 |
| 130 | 0.0 | 2.1 | 1.9 | 1.8 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 | 1.2 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 |
| 140 | 0.0 | 1.9 | 1.8 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 | 1.2 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150 | 0.0 | 1.8 | 1.7 | 1.6 | 1.5 | 1.4 | 1.3 | 1.2 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

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PREDICTED YIELD INCREASE (BU/AC) TABLE

CROP=FLAX | IRRIGATION=AVERAGE

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 6.1 | 10.9 | 14.8 | 18.0 | 20.8 | 23.1 | 25.1 | 26.9 | 28.4 | 29.8 | 31.0 | 32.1 | 0.0 | 0.0 | 0.0 |
| 20 | 0.0 | 4.8 | 8.7 | 12.0 | 14.7 | 17.0 | 19.1 | 20.8 | 22.4 | 23.8 | 25.0 | 26.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| 30 | 0.0 | 3.9 | 7.2 | 9.9 | 12.2 | 14.3 | 16.0 | 17.6 | 18.9 | 20.2 | 21.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 40 | 0.0 | 3.2 | 6.0 | 8.3 | 10.3 | 12.1 | 13.7 | 15.0 | 16.3 | 17.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 50 | 0.0 | 2.7 | 5.1 | 7.1 | 8.9 | 10.4 | 11.8 | 13.0 | 14.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 60 | 0.0 | 2.3 | 4.4 | 6.1 | 7.7 | 9.0 | 10.3 | 11.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 70 | 0.0 | 2.0 | 3.8 | 5.3 | 6.7 | 7.9 | 9.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 80 | 0.0 | 1.8 | 3.3 | 4.7 | 5.9 | 7.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 90 | 0.0 | 1.6 | 2.9 | 4.2 | 5.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100 | 0.0 | 1.4 | 2.6 | 3.7 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110 | 0.0 | 1.2 | 2.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120 | 0.0 | 1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

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PREDICTED YIELD INCREASE (BU/AC) TABLE

CROP=FLAX | IRRIGATION=OPTIUM

| | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 6.5 | 11.8 | 16.3 | 20.0 | 23.3 | 26.1 | 28.6 | 30.8 | 32.7 | 34.5 | 36.0 | 37.5 | 38.7 | 39.9 | 41.0 |
| 20 | 0.0 | 5.3 | 9.8 | 13.6 | 16.8 | 19.6 | 22.1 | 24.3 | 26.2 | 28.0 | 29.6 | 31.0 | 32.3 | 33.5 | 34.5 | 35.5 |
| 30 | 0.0 | 4.5 | 8.2 | 11.5 | 14.3 | 16.8 | 19.0 | 20.9 | 22.7 | 24.2 | 25.6 | 26.9 | 28.1 | 29.2 | 30.2 | 0.0 |
| 40 | 0.0 | 3.8 | 7.0 | 9.9 | 12.3 | 14.5 | 16.5 | 18.2 | 19.8 | 21.2 | 22.5 | 23.7 | 24.8 | 25.8 | 0.0 | 0.0 |
| 50 | 0.0 | 3.2 | 6.1 | 8.5 | 10.7 | 12.7 | 14.4 | 16.0 | 17.4 | 18.7 | 19.9 | 21.0 | 22.0 | 0.0 | 0.0 | 0.0 |
| 60 | 0.0 | 2.8 | 5.3 | 7.5 | 9.4 | 11.2 | 12.7 | 14.2 | 15.5 | 16.6 | 17.7 | 18.7 | 0.0 | 0.0 | 0.0 | 0.0 |
| 70 | 0.0 | 2.5 | 4.7 | 6.6 | 8.4 | 9.9 | 11.3 | 12.6 | 13.8 | 14.9 | 15.9 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 80 | 0.0 | 2.2 | 4.1 | 5.9 | 7.4 | 8.9 | 10.2 | 11.4 | 12.4 | 13.4 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 90 | 0.0 | 1.9 | 3.7 | 5.3 | 6.7 | 8.0 | 9.2 | 10.3 | 11.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100 | 0.0 | 1.7 | 3.3 | 4.7 | 6.0 | 7.2 | 8.3 | 9.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110 | 0.0 | 1.6 | 3.0 | 4.3 | 5.5 | 6.6 | 7.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120 | 0.0 | 1.4 | 2.7 | 3.9 | 5.0 | 6.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130 | 0.0 | 1.3 | 2.5 | 3.6 | 4.6 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140 | 0.0 | 1.2 | 2.3 | 3.3 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150 | 0.0 | 1.1 | 2.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

ADDED YIELD INCREASE (BU/AC) TABLE

CROP=FLAX | IRRIGATION=AVERAGE

| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 6.1 | 4.8 | 3.9 | 3.2 | 2.7 | 2.3 | 2.0 | 1.8 | 1.6 | 1.4 | 1.2 | 1.1 | 0.0 | 0.0 | 0.0 |
| 20 | 0.0 | 4.8 | 3.9 | 3.2 | 2.7 | 2.3 | 2.0 | 1.8 | 1.6 | 1.4 | 1.2 | 1.1 | 0.0 | 0.0 | 0.0 | 0.0 |
| 30 | 0.0 | 3.9 | 3.2 | 2.7 | 2.3 | 2.0 | 1.8 | 1.6 | 1.4 | 1.2 | 1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 40 | 0.0 | 3.2 | 2.7 | 2.3 | 2.0 | 1.8 | 1.6 | 1.4 | 1.2 | 1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 50 | 0.0 | 2.7 | 2.3 | 2.0 | 1.8 | 1.6 | 1.4 | 1.2 | 1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 60 | 0.0 | 2.3 | 2.0 | 1.8 | 1.6 | 1.4 | 1.2 | 1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 70 | 0.0 | 2.0 | 1.8 | 1.6 | 1.4 | 1.2 | 1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 80 | 0.0 | 1.8 | 1.6 | 1.4 | 1.2 | 1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 90 | 0.0 | 1.6 | 1.4 | 1.2 | 1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100 | 0.0 | 1.4 | 1.2 | 1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110 | 0.0 | 1.2 | 1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120 | 0.0 | 1.1 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

ADDED YIELD INCREASE (BU/AC) TABLE

CROP=FLAX | IRRIGATION=OPTIUM

| SOIL TEST NITROGEN (LB/AC /2 FT DEPTH) | RATE OF NITROGEN FERTILIZER (LB/AC) | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 0 | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 110 | 120 | 130 | 140 | 150 |
| 10 | 0.0 | 6.5 | 5.3 | 4.5 | 3.8 | 3.2 | 2.8 | 2.5 | 2.2 | 1.9 | 1.7 | 1.6 | 1.4 | 1.3 | 1.2 | 1.1 |
| 20 | 0.0 | 5.3 | 4.5 | 3.8 | 3.2 | 2.8 | 2.5 | 2.2 | 1.9 | 1.7 | 1.6 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 |
| 30 | 0.0 | 4.5 | 3.8 | 3.2 | 2.8 | 2.5 | 2.2 | 1.9 | 1.7 | 1.6 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 |
| 40 | 0.0 | 3.8 | 3.2 | 2.8 | 2.5 | 2.2 | 1.9 | 1.7 | 1.6 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 |
| 50 | 0.0 | 3.2 | 2.8 | 2.5 | 2.2 | 1.9 | 1.7 | 1.6 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 |
| 60 | 0.0 | 2.8 | 2.5 | 2.2 | 1.9 | 1.7 | 1.6 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 70 | 0.0 | 2.5 | 2.2 | 1.9 | 1.7 | 1.6 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 80 | 0.0 | 2.2 | 1.9 | 1.7 | 1.6 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 90 | 0.0 | 1.9 | 1.7 | 1.6 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 100 | 0.0 | 1.7 | 1.6 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 110 | 0.0 | 1.6 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 120 | 0.0 | 1.4 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 130 | 0.0 | 1.3 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 140 | 0.0 | 1.2 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 150 | 0.0 | 1.1 | 1.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

N.L.C. - B.N.C.
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